

Selected Writings of Ellen Churchill Semple

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Mountain Passes: A Study in Anthropogeography

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MOUNTAIN PASSES: A STUDY IN ANTHROPO- GEOGRAPHY.

BY

ELLEN CHURCHILL SEMPLE.

Mountains influence the life of the people dwelling in and near them fundamentally, but variously. To one slope they give perhaps an abundant rainfall, to the other they show a cloudless sky and yield only from their melting snows a scanty supply of water. The Himalayas are flanked by the teeming population of India and the sparse nomadic tribes of Tibet. Mountains draw just such clear-cut lines of contrast in temperature. The Scandinavian range gives to Norway the warm, soft air of the Gulf Stream, while a hundred feet below the water-shed on the eastern side Sweden feels all the rigor of a sub-frigid climate. An upland system may offer broad, fertile valleys for cultivation, like the Valley of Virginia; or it may present only narrow gorges of erosion, as in eastern Tennessee and Kentucky, restricting agriculture and condemning the whole region to poverty and isolation; or it may in effect prohibit agriculture, if situated in high latitudes, where the timber-line drops well below the crest, and may force its inhabitants to the semi-nomadic life of shepherds, as in Norway and in some parts of Switzerland, where the summer pasture lands on the heights support the flocks and herds; or mountains may promote the rapid development of a people by great mineral resources, as in the Harz, the Rockies, and the western Alleghanies. These influences are some beneficent and some deleterious, always varied. But in one respect mountains always play the same big part in history. They are always barriers, always obstacles, more or less difficult to surmount, and, therefore, always a challenge to the energies of man. Their beauty, the charm of the unknown beyond, tempts the enterprising spirit; but the hardships and dangers they present daunt or baffle the mediocre, while by the great ones of the race who succeed is found beyond a prize of victory. Such were Hannibal and Napoleon and Jenghiz Khan and those lesser heroes of the modern work-a-day world who toiled across the Rockies in the feverish days of '49, or who faced the snowfields of Chilkoot Pass for the frozen gold fields of the Yukon.

For migrating, warring, and trading humanity, therefore, the

interest of the mountains is centred in the passes. These are only dents or depressions in the great uplifted crest, or gaps carved out by streams, or breaches in the mountain wall; but they point the easiest pathway to the ultramontane country, and for this reason become the focus of all the great highways on either slope, as well as of the side valleys within the mountains themselves. Their influence is far-reaching. The Brenner, in the eastern Alps, by its continental trade in the Middle Ages, made the greatness of Augsburg, Ratisbon, Nuremberg and Leipzig to the north, and promoted the growth of Venice in the south. The Khaibar Pass, in northern India, and the Gates of Herat, in western Afghanistan, are never lost sight of by the British and Russian Governments in formulating their Asiatic policy. Passes never become insignificant, are never unused except when the deep cover of winter snow temporarily renders travel impossible. They are nature-made thoroughfares, traversed now by the undisciplined hordes of migrating barbarians, now by the organized army of the conqueror, now by the woolly flocks and guardian dogs of the nomad pastor, now by the sumpter mules of the itinerant merchant, now by the engine toiling up the steep grade with its heavy train. Nowhere else does history repeat itself so monotonously and yet so interestingly as in mountain passes.

Mountain ranges form in general great natural cleavage lines of drainage basins, of flora, fauna, races, population, commerce, and consequently of nationality and political dominion. Most of the history of central Europe since the time of Charlemagne has meant the slow evolution of the scientific boundaries of the modern States formerly embraced in his great empire, along the mountain ranges marking their natural frontiers. The latest step was taken in 1871, when the nascent German Empire drew its frontier along the Vosges crest instead of in the valley of the Rhine. All the States in the upland part of the continent have one or more mountain boundaries. Five States abut upon the Alps. The Vosges, the Alps, the Böhmer Wald, the Riesen and the Erz ranges form the highland frontiers of Germany. Even in our own republic, where State boundaries count for little, "the mountainous back-yards of nine states," as a recent writer picturesquely expresses it, extend up into the lofty ridges of the Appalachian system.

Besides forming natural frontiers, mountains serve as border defences, and for this reason, too, recommend themselves as political boundaries. The effectiveness of such defence depends upon the character of a range as a barrier. This in turn is determined

by the height, length, width, form, and location of the mountains themselves and the passes that traverse them. The Tian-Shan mountains, with a length of twelve hundred miles and a mean width of two hundred and forty miles, raise a wall 16,000 feet high across Central Asia in which there are almost no gaps except near the eastern and western extremities. The Pyrenees, the Caucasus, the Scandinavian system, and the Andes, on account of the scarcity and great elevation of their passes, have always acted as great barriers. Epirus and Ætolia, fenced in by the solid Pindus range, took little part in the common life of ancient Greece; but Thessaly, with its intermittent chains, was a passway between Macedon and Hellas. The Hindu-Kush, from the Pamir to the Pass of Bamian northwest of Kabul, forms a crescent a hundred and twenty miles long, in which there are at least twenty gaps, varying in height from 11,000 to 15,000 feet and sometimes accessible to caravans of camels. These mountains, therefore, in spite of their height, presented open doors to the succession of invaders who left Turan and Iran for the fertile plains of the Indus. The passes in the Suleiman Mountains along the Indo-Afghan frontier number two hundred and eighty-nine, every one capable of being traversed by camels; and in the continuation of the range along the borders of Baluchistan there are seventy-five more. An enemy's army stationed at Kandahar would command most of these passes; hence the importance of Kandahar to British India. The Alps have an astonishing number of excellent passes, for the most part evenly distributed, so that it is possible to traverse the system from one side to another in any direction. The Appalachian system is some three hundred miles in width and thirteen hundred miles in length; but there are excellent gaps in the linear arrangement of its parallel chains, which afforded natural, though circuitous, highways to the early winners of the West. The disposition of the passes is such that, one range penetrated, the next presents a similar barrier, so that the longitudinal valleys in between have to be traversed before another opening can be found. The pioneer who started across the mountains from Virginia could come out on the slopes of the Cumberland Plateau either by way of the Kanawha River to the Ohio, or down the valley of the Holston, through Big Moccasin Gap, Big Stone Gap, and Cumberland Gap, into southeastern Kentucky.

The Appalachian system could also be avoided by making a long detour to the south, where the mountains run out into low hills in the eastern Gulf States; but where a range extends down to the ocean, like the Alps, or reaches from sea to sea, like the Pyrenees,

the Caucasus and the Grampian Hills of Scotland, its blockading character is enhanced, especially for military purposes and in a primitive stage of civilization, before the achievement of maritime development. The Caucasus was a barrier to most of the migrating peoples of antiquity. The Romans never got across them. The Persians only temporarily forced a wedge of conquest along the Caspian shore. Mountains thus located develop a few geographical conditions peculiar to themselves. As a rule, at one or both extremities they sink to meet the flanking seas; and here, between upland and water, they may afford a natural highway only a little above ocean-level. The Pyrenees are crossed by only two railroads between France and Spain, the Bayonne-Burgos line along the shore of the Bay of Biscay, and the Narbonne-Barcelona line, overlooking the Mediterranean. Between these two extremities there are only two practical passes for carriages—the Col de la Perche, between the valley of the Tet and the valley of the upper Segre, and the Port de Canfranc, on the old Roman road from Saragossa to Oloron.

Some mountains thus located offer a pass at one extremity, but at the other drop off abruptly into the sea. The Pass of Derbent, or the *Pylæ Albaniæ*, as it was called by the ancients, lies between the Caspian and the last offshoots of the Caucasus, and in all ages has been the highway for the peoples entering Persia and Georgia from the north. The Russian railroad from Rostov, at the mouth of the Don, on the Sea of Azov, to Poti, on the Black Sea, runs along the northern base of the Caucasus to Derbent, where it follows the pass between mountains and sea to Baku; here it doubles the eastern end of the Caucasus and follows the valley of the Kur westward to Poti. The western shore of the Caucasus daunts the Russian road-makers to-day; and in antiquity the retreat of Mithridates along this wild coast, when driven out of his kingdom by the victorious legions of Pompey, was considered one of the marvels of the age. We see the same contrast between the eastern and western Highlands of Scotland; one of the two railroads running north and south through the country hugs the eastern shore. Even in Greece, where the arrangement of the mountains is much more complex, the Pass of Thermopylæ again is on the eastern rim.

For purposes of trade these intermarine mountains offer a less effective barrier, because they can be avoided by an easier and cheaper sea route. Hence on each side of such ranges we find active seaports develop, like Narbonne and Barcelona, Bayonne and Bilbao, with Santander; the Azov ports and Poti, with Trebizond,

on the Black Sea; Petrovsk and Baku on the Caspian. Analogous is the position of Marseilles and Genoa in relation to the Maritime Alps. In time of war such ports are always the object of attack by the invading force, because they can be made the base for military and commissary supplies. In the Peninsular War almost the first act of the French was to seize Barcelona, San Sebastian, and Bilbao; and throughout the seven years of the conflict these points were the centre of battle and blockade and siege. If Russia ever undertakes to acquire the upper Euphrates valley from Turkey, Trebizond will repeat the history of Barcelona in the Peninsular War.

In plains and valleys highways may be built arbitrarily, bending to north or south, east or west, as expediency suggests; but in mountain regions the passes dictate the route of the thoroughfare. In the highest ranges there is no appeal from this; but in the lower systems, especially in those old mountains which have been rounded and lowered by the action of time, economic and sociological considerations may in some instances be of greater moment than orographical conditions in determining the location of highways. Nevertheless, the law holds good that the pass points the road. In the eastern Tian-Shan, where the range reaches only 10,000 feet elevation, the passes are 9,000 feet high; and in the western portion of the system, where the crest is 16,000 feet high, the passes are from 11,500 feet to 13,100 feet high, so that the range preserves everywhere its wall-like character. It has, therefore, determined the routes of two great historic highways from China to Bukhara and Samarkand. These roads diverge at the town of Chami or Hami (elevation, 2,700 feet), on the northern edge of the Gobi Desert. One, now the imperial road, leads north across the Kosheti-Davan Pass (9,100 feet) to Barkul, thence along the base of the range westward by Kulja and the Ili River, and over western offshoots of the Alatau range to Tashkent. This was the route followed by the Mongol and Tartar hordes in the thirteenth century, and was even then a great commercial highway. The other runs almost parallel with this one, directly west, along the southern base of the Tian-Shan for almost a thousand miles up the Tarim basin to Kashgar, and above this city it leads by the high passes between the Tian-Shan and Alai, or over the northern Pamir, to the head streams of the Syr-Daria and the Oxus. The Bukhara-Samarkand railroad has recently been extended by Russia northeastward from Khojent to Andijan (1,400 feet), whence trade can move over the Terek-Daban Pass (12,200 feet) and connect with this second route at Kashgar. All the western approaches to the northern route

Russia already controls by her possession of the district between Lake Balkash and the Tian-Shan.

On another great upheaved area in this vicinity Russia has also made good her claims; but the Pamir, despite the great height of its passes—in consequence of its character as the focus of five great radiating mountain systems—assumes a different anthropogeographical aspect. The Pamir has an estimated area of 30,000 square miles. It rises 13,000 feet above the plains of Turkistan, and is limited on the north, south, and southeast by ranges that tower eight or ten thousand feet higher. Moreover, the plateau itself is traversed by minor ridges, which rise two or three thousand feet above its surface, and between which the streams drain east and west without any well-defined watershed. This topography lends to the whole Pamir the character of a great pass area. From its summit or its slopes drain four great rivers of Asia—the Syr-Daria, the Oxus, the Tarim, and the northern tributaries of the Indus. Only the last river, however, reaches the ocean. These streams form natural avenues of approach. On the surface of the plateau the transverse ridges present no serious obstacles, and the valley routes between can almost be compared to artificial highways. More than this, the Pamir is a famous pasture land, and the grass grows as thick in some places as in the grazing grounds of Western Europe. The nomad Kirghiz shepherds bring their flocks and herds up here to fatten in the summer, and travellers, from Marco Polo's day to the present, have found here a regular supply of fodder for their pack animals.

For all these reasons, in spite of the great elevation of its passes (varying from 13,400 feet to 15,100 feet), the Pamir has been a great highway from the west to the east since the earliest times. It has been traversed by Greeks, Romans, Arabs, Italians, and Chinese; by traders, pilgrims, missionaries, explorers, and even by light columns of troops. The particular route followed by the early Greek traders, as indicated by Ptolemy, probably led from Bactria through the upper Oxus valley, and across the southern portion of the Pamir down to Kashgaria. Marco Polo followed about this route and descended to Yarkand in the Tarim basin, whence he skirted the desert of Gobi on the south and entered China proper by the headwaters of the Hoang-ho. In the tenth century, large Chinese caravans from "Serica," or the "Land of Silk," moved regularly up the Tarim basin and across the passes at the northeast corner of the Pamir to the sources of the Syr and the Oxus. Russia, with an eye to the possibilities of the Pamir,

annexed almost the whole of its area in 1886 to the administrative government of Bukhara.

An important question in connection with mountain passes is the difference in the grade and length of the slope approaching them. Rarely does the crest of a system divide it symmetrically. This means a steep, difficult approach to the summit from one direction, and a more gradual, and hence easier, ascent from the other. The country commanding the easy approach has in time of war a better chance to surprise the ultra-montane enemy by a sudden and swift descent from the dividing ridge, and can command a long line of successive points of supplies connecting with its real military base in the plains. For instance, if Russia and England should come into conflict along the Hindu-Kush and the southern Pamir, England's military base would be at Peshawar (1,160 feet), and the distance from here to her outpost at Fort Chitral (7,100 feet), at the southern foot of the Hindu-Kush, is 120 geographical miles as the crow flies. Russia's outpost, just across the Hindu-Kush wall from Fort Chitral, is Ishkashim (8,700 feet); her main military base would be at Bukhara (640 feet), her nearest railroad point, which is distant six hundred miles by the air line; but the long, slowly ascending valley of the Oxus would afford her an easy avenue of approach, while the towns and villages of upper Bukhara, with more abundant water than the cities of the Turkistan plains, can furnish adequate supplies up to the very edge of the Pamir. The problem of commissary and transportation is simpler for the Russians than for the English on the steep southern slope. The same contrast of slopes is seen in the Alps. The drop from the Brenner Pass to Munich is 2,800 feet, and to Rovereto, an equally distant point on the southern side, the road descends 3,770 feet. The political boundary of France, following closely the crest of the Alps from Lake Geneva to the Mediterranean, brings over two-thirds of the upheaved area within the domain of France, and gives to that country great advantages of approach to the Alpine passes over Italy. It is a matter of history, from the days of Hannibal down to the present, that the campaigns over the Alps from the north have succeeded, while those from the south have miscarried.

The Kirghiz nomads who frequent the highlands of central Asia from the Tian-Shan to the Hindu-Kush for the summer pasturage are authorities on mountain passes; they distinguish four different kinds, for which they have four Tartar names. The *daban* or *davan* is a rocky, difficult defile; the *art*, a dangerous gap at high elevation; the *bel* is a low, easy pass; and the *kutal* is a broad open-

ing between low hills. As a bit of anthropogeography this nicety of discrimination suggests the twenty-one words for tints and shades of gray of the Samoyedes of Arctic Siberia. Though without this elaborate terminology, we yet distinguish as many varieties of passes. As a pass points a highway, the form most easily traversed is the one that plays the greatest part in history. Such a form is found in an almost complete break or dip of a mountain system. The natural depression of the Hudson and Mohawk valleys, only a hundred and seventy-five feet above sea-level, is the only decided break in the whole length of the Appalachians; this fact, together with its ready accessibility, made it an important factor in the history of the early colonies, as well as in the later history of New York. It was the natural route of communication with the Great Lakes, and enabled the colonists to tap the fur trade of the north-west, then in the hands of the French. Furthermore, trails from the Mohawk and Genesee to the Alleghany connected this depression with the Ohio and Mississippi, then claimed by the French. So, when the French and English came into conflict for supremacy in the New World, the Mohawk and Hudson valleys were their battle-ground, determined by the geography of eastern America. In later days this depression rendered possible the Erie Canal, and the greatness of New York City; and in the not remote future, when the Erie Canal is deepened, it will connect the proposed steel works on Staten Island with the ore-fields of the Mesaba Range.

An exact parallel to the Mohawk route is afforded by the Gap of Belfort. This is a low pass, twenty-five miles wide, between the Vosges Mountains and the Alps system, here called the Swiss Jura. Connecting, as it does, the long valleys of the Rhone and the Rhine, it has been the great historic route of trade and travel between the North Sea and the Mediterranean from the days of the ancient Etruscan merchants to the present. This was the route of the invading Teuton hordes, and later of the Germans under Ariovistus, when they tried to occupy Gaul; and it was near Mühlhausen, in upper Alsace, that Cæsar defeated that chieftain. Four centuries later came the Alamannians, and, though defeated at Strassburg by the Emperor Julian, by this route they subsequently passed over into Alsace. It is the strategic key to central Europe, and was recognized as such in 1870 when the Germans massed their forces to invade France. It is traversed to-day by railroads to Paris and Lyons, and by a canal from Montbéliard to Mühlhausen and Basel, connecting the Doubs and the Rhine. A similar pass is to be

found in the famous "Gates of Herat." The Hindu-Kush Mountains run off in the northwestern corner of Afghanistan, just north of Herat, into a ridge of low, grassy downs not more than nine hundred feet above the surrounding country, and through them flows the Heri-rud on its course from the plateau of Herat (2,600 feet) down to the low plains of Russian Turkistan.

Another order of pass, but allied to the last in its low elevation, is represented by the Brenner, which is a deep saddle in the eastern Alps, joining the Inn and Adige valleys. It is 4,460 feet above the sea, but only 2,760 feet above the foot of the pass where the Inn flows out into the Bavarian plateau, and thus forms the lowest line of communication across the Great Alps. The Brenner was the route by which the Cimbri came into the valley of the Po, and by which at a later date the Romans communicated with their possessions on the Danube and the upper Rhine. It was the road by which in the Middle Ages the armies of the German Emperor came to make good his claim on Italy. Through this gap Austria thrust her strong arm to keep her hold on the plains of Lombardy. By this road came the artists and artisans of the north country to learn the arts and crafts of beauty-loving Venice. From the Roman road-makers to the present railroad engineer, with all the concomitant civilization of each, the Brenner has seen the march of human progress. The Austrian Alps further east, dropping to a lower altitude while the ranges spread out, are crossed by many passes of slight elevation, like the Semmering (3,200 feet), through which was built in 1854 the first railroad over the Alps. These passes determined Rome's expansion to the Danube, just as later they exposed her to the inroads of the Goths and Huns.

Passes that reach a higher altitude than the Brenner can, for all practical purposes, be grouped together, though they may be distinguished in certain minor details of anthropogeographical interest. The Barogil Pass (12,000 feet), leading from the headwaters of the Chitral River over the Hindu-Kush to the Pamir, is a grassy plain, whither the nomads of the upper Oxus come to graze their cattle, and, according to one traveller, it might be crossed in a wheel wagon. The summit of the Little St. Bernard (7,420 feet), one of the easiest and earliest-known passes of the western Alps, is a pasturage plain three miles long. A circle of stones here is supposed to mark the place of a council of war held by Hannibal while waiting for the stragglers to come up. By contrast, the Brèche de Roland (9,337 feet), in the Pyrenees, is a great portal, only 300 feet wide, in a ridge of rock forming the boundary between France and

Spain. Legend says it was cut through by Roland's sword, Durandal, to open a passage in pursuit of the Moors. And in far-away Persia we hear of the Shamsheer bur Pass, or "Sword-hewn," held sacred as the work of Ali's sword, and one of the oldest and most frequented routes of northern Media.

When a mountain system consists of a single narrow range, it can be traversed by a single pass, like the Pass of Dariel over the Great Caucasus, or the Pass of Canfranc over the central Pyrenees. The same result follows where the summits of broader mountains also are approached by long, transverse erosion valleys which have been cut out from the heart of the system. The western Alps are completely dissected on the French side by the Durance, Drac, and Isère, so that the ridge of the system has to be traversed only at one point. In consequence of the ready accessibility of this range there were four established routes here in the days of the Roman Empire: I. The *Via Aurelia*, between the Maritime Alps and the sea. II. The *Mons Matriona* (Mont Genève, 4,100 feet), between the head stream of the Dora Riparia and that of the Durance, which was the best highway for armies. III. The Little St. Bernard, from Aosta, on the Dora Baltea, over to the Isère and down to Lugdunum (Lyons). IV. The Great St. Bernard route, which led northward from Aosta (*Augusta Prætoria*) over *Mons Penninus* to *Octodurus*, at the elbow of the upper Rhone, where Martigny now stands. In the central Alps the Romans used only the Brenner route, which, like the others mentioned, surmounted the Alps at a single pass and formed the ancient line of communication with *Augusta Vindelicorum* (Augsburg). They seem not to have known the St. Gothard, which, though higher than the others, is the summit of an unbroken ascent from Lago Maggiore up the valley of the Ticino on one side, and from Lake Lucerne up the Reuss on the other.

Mountains which spread out on a broad base with a succession of parallel ranges, and through which no long transverse valleys afford ready transit, must be crossed by a succession of passes determining more or less circuitous routes. The central Alps fall into such parallel ranges, divided by the longitudinal valleys of the Upper Rhone and Upper Rhine. Only by the great central dome of the St. Gothard, analogous to the Pamir, can they be crossed by one pass. Everywhere else the northern range must be crossed by some minor pass like the Gemmi (7,553 feet), or Panixer (7,907 feet), to the longitudinal valleys, and the southern range again by the Simplon (6,595 feet), San Bernardino (6,768 feet), Splügen (6,946 feet), or Septimer (7,582 feet), to the southern slope. The old

route from Augsburg to Milan followed the valley of the Lech south to the Kalk Alps, which it crossed by the Fern Pass to the valley of the Upper Inn, then led up this valley to the eastern boundary of the Grisons, where it turned south and by the Reschen-Scheideck (4,898 feet) crossed the central Alps; finally it traversed the southern Alps, by the Stilfser Joch, to the valley of the Adda and Lake Como. More circuitous still are the routes through the Austrian Alps, or the caravan road from Peshawar, in the Punjab, over the countless ranges of the Hindu-Kush to Balkh, in the plains of northern Afghanistan. The route leads through the Khaibar Pass, then along the gorges of the Kabul river, crossing several minor ranges, to the city of Kabul (5,740 feet); then by the Unai Pass over the Paghman mountains into the valley of the Hilmend River, over the main range of the Hindu-Kush by the Hajikhak Pass (12,000 feet), or famous Gates of Bamian, from Bamian north by the Ak Robot to the Khulm river, which it follows down to the trading points on the Bukhara frontier. This road presents so many difficulties that caravans from Turkistan to India prefer another route up the valley of the Heri-rud to Herat, thence diagonally south-east across Afghanistan to Kandahar, and thence by the Bolan Pass southeast to the Sind. The successive ranges of the southern Appalachians necessitate a circuitous journey in crossing them; but their passes are in general broad, flaring water-gaps, resulting from the peculiar geodetic history of this section, and their spacious intermontane valleys afford natural highways, so that after the feet of the first pioneer had beaten a track over the eastern ranges, and Daniel Boone had blazed the Wilderness Road from Cumberland Gap to central Kentucky, the Appalachians presented no very serious barrier to the frontiersman.

Quite as important to communication as pass or gap, therefore, is the question of the avenue of approach to the same. This the transverse erosion valleys of mountains have always furnished. The stream determines the highway leading to the pass, and the length of the stream, generally speaking, determines the importance of the road. The passes in the Alps which are approached by deep re-entrant valleys are those that are crossed by railroads to-day: Mont Cenis, St. Gothard, and Brenner. The Canadian Pacific Railroad, utilizing such transverse valleys, runs from Vancouver eastward up the cañon of the Fraser river across the Cascade Range; then up the cañon of its tributary, the Thompson river, to Eagle Pass over the Gold Range; then up the Kicking Horse cañon to Kicking Horse Pass (5,240 feet), by which it crosses the Selkirk Rockies,

and then drops to the plains down the gorge of Bow river. The Northern Pacific Railroad uses the upper Missouri in western Montana in its ascent of the Rockies, and the Columbia for its passage through the Cascade Range. The Columbia and the Fraser cañons are not transverse valleys in quite the same physiographical sense as the others mentioned, but these rivers, like the Danube at the Iron Gate, sawed their way through a nascent mountain range as it slowly protruded its ridge.

But the regular transverse valley is the route from summit to plain, where it connects with a pass. The passes themselves have only emergency inhabitants—the monks and dogs of the hospice, the road-keepers in their refuge huts or *cantoniere*, or the garrison of a frontier fort or military colony, as in the Roman days, to hold these important thoroughfares. The flanking valleys of approach draw to themselves all the active life of the mountains. Here are concentrated commerce, population, and what scanty resources the barren upland may furnish. Their settlements have a similarity of location and physiognomy. Especially is this true of routes where there is no railroad line, and where no carriage-road has been constructed over the summit. The Alpine passes have gone beyond this stage of development, which, however, predominates in the Pyrenees. In the upper part of the valley, where the carriage road ends and where the mule-path or foot-trail begins, we find a small settlement. Here the traveller can spend the night, rest his animal, and supply himself with what is necessary for the long, final ascent to the summit. Such places are Andermatt and Airolo on the St. Gothard route, Chamouni on the Tête Noire, Courmayeur, and a dozen others well known to the tourist in Switzerland.

A little further down the valley the type changes. Here the main valley develops a point where side valleys converge, each one of which in turn may lead to passes. Such a point necessarily becomes a focus of life and of trade, because it is a natural distributing centre for commodities destined for the highland inhabitants. Chiavenna, at an altitude of 1,090 feet, is situated just above the head of Lake Como at the junction of the Mera and Liro valleys, the first of which leads north by the Splügen Pass to the Hinter Rhine, and the second east by the Maloja Pass (5,940 feet) to the headwaters of the Inn just above St. Moritz. The town has a population of about 4,000. Such a point is Aosta (1,913 feet), on the Dora Baltea, in northwestern Italy. It controls the great St. Bernard (8,120 feet) and the less important Col de Fenêtre (8,856 feet) leading north to Martigny, on the Upper Rhone; and the

Little St. Bernard highroad to the Isère, together with the Col de la Seigne and Col du Bonhomme road, to the Val Montjoie and the valley of the Arve. Aosta has now a population of 8,000. It was an important place in the Roman period, as the existing antiquities testify. The location of Bellinzona, in northern Italy, makes it the centre of radiating lines of communication. It commands two railroad lines, one of which leads southeast to Milan, the other south to Genoa; and is the converging-point of four Alpine routes—the St. Gothard to Lake Lucerne, the Lukmanier Pass (6,290 feet) to Disentis, on the Upper Rhine, the Greina Pass (7,743 feet) to Ilanz just below, and the San Bernardino to the Hinter Rhine and Coire. Bellinzona has now a population of 2,500. In the Middle Ages it was strongly fortified by the Dukes of Milan, and was regarded as the key to the route between Lombardy and Germany. But one of the most remarkable situations of this kind is to be found in northeastern Afghanistan, at the southern foot of the Hindu-Kush. The village of Charikar, near the confluence of the Panjshir with the Ghorband, a northern tributary of the Kabul river, is the converging-point of eighteen passes over the Hindu-Kush, and probably occupies the old site of *Alexandria ad Caucasum*. Kokan, commanding the approach to the passes of the western Tian-Shan and the northern Pamir, is an important place in point of population, civilisation, and trade. Its bazaars are very active, and are the best-stocked in Russian Turkistan, with goods from Europe, Persia, and India.

Important points for towns are found also where transverse valleys intersect longitudinal valleys. Innsbruck is the capital of the Tyrol, because it controls the Brenner and also a western route up the valley of the Inn and across the Arlberg Pass (5,994 feet) to Lake Constance. Further south, Brixen lies at the junction of the Brenner and Pusterthal, which leads directly east to the valley of the Drave and the Danube. The importance of the Pusterthal and the Arlberg is evidenced by the fact that they are now traversed by railroads. The Furka Pass (8,150 feet), which connects the valleys of the Upper Rhone and the Upper Rhine very near where the central mass of the Alps is crossed by the St. Gothard road, lies too high for any town to develop here; but the streams which it connects present a long line of villages, representing a series of passes over the northern and southern ranges, just as do the villages of other longitudinal valleys of the Alps, like the Inn, the Adda, and the Mur. Where the Upper Rhone leaves its great longitudinal valley and bends at a right angle northward to Lake

Geneva, we have the town of Martigny (Roman Octodurus, 1,558 feet elevation), which commands, besides the routes up and down the Rhone valley, a number of passes south over the Pennine Alps to Italy, and over the western range to Savoy. The location of Martigny is duplicated in that of Coire (Curia), at the elbow of the Upper Rhine, with its connection by river north to Lake Constance, south by five passes (Julier, Septimer, Splügen, San Bernardino, and Lukmanier) to Italy, and southeast by the Albula and Flüela passes to the Engadine. Though situated at an altitude of 1,936 feet, Coire has a population of about 9,000. All such towns are distinctly mountain settlements; they are centres of mountain life, and their importance is due to the routes of highland travel they control.

(To be continued.)

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MOUNTAIN PASSES: A STUDY IN ANTHROPO-
GEOGRAPHY.*

BY

ELLEN CHURCHILL SEMPLE.

We now come to the pass city, which is situated in the plains or lowlands at the foot of a pass, and which draws its support both from mountains and plains. It is located on the line of travel which always skirts the base of a mountain range, at the point where this is intersected by a transverse route of communication across the highlands. The greater fertility of the plains makes for a larger centre of population, the intersection of trade routes ensures commercial activity; hence such points offer conditions for large and flourishing cities, especially if railroads follow the two lines indicated. Such is the location of Narbonne and Barcelona at the extremities of the route over the eastern Pyrenees; Toulouse commanding the central passes, and Bayonne the western. The St. Gothard route is flanked by Lucerne on the north and Milan on the south, just as the Brenner is by Munich and Verona. Tiflis is situated in the great valley highway between the Caspian and Black Seas, but through the Pass of Dariel (7,954 ft.) to the north come the influences that make it a Russian town. Peshawar depends more upon the Khaibar Pass and its connections thereby with central Asia than upon the Indus river. Kabul, which commands the western entrance to this route, and lies on the great thoroughfare through the Pass of Bamian to Russian Turkistan, is one of the keys of India; while Kandahar, the other, occupies the point where all the routes of western and southern Afghanistan converge for the descent through the Bolan pass to the Sind. But great as is the

* Continued from BULLETIN No. 2, 1901, p. 137.

commercial and strategic importance of these cities, it sinks into insignificance in comparison with that of Herat, which commands the Heri-Rud depression leading down to Turkistan. In the twelfth century, according to a Persian historian, it had 444,000 houses and 12,000 shops. It has been attacked and destroyed fifty times, each time rising from its ruins. The Russians plan eventually to make it the terminus of the Trans-Caspian Railroad.

Where mountains follow a semi-circular course, the routes over their passes must tend to converge on the inner side. Such foci of highways are the fore-ordained sites of great commercial centres. The bazaars of Merv are fed by all the mountain routes from Meshed in Persia to Kabul in eastern Afghanistan. Khulm and Balkh draw on all the twenty or more passes over the Hindu-Kush and the Pamir, Bukhara is the focus of all the southern routes on which, in relation to itself, Merv and Khulm are only intermediary points; while with Samarkand and Tashkent it shares a position before the great valleys of the western Tian-shan. Its location would make it one of the great cities of the world were it not for the encircling desert and the scantiness of its water supply, which is tapped further up stream for the irrigation of Samarkand. In its bazaars are found drugs, dyes, and teas from India; woven goods, arms, and books from Persia; arms and fine horses from Merv; wool, skins, and dried fruit from Afghanistan, and Russian merchandise from Moscow, Nijni-Novgorod, and Orenburg. English goods, which formerly came in by the Kabul route, have been excluded since Russia established a protectorate over the province of Bukhara. Just across the highlands of central Asia, to the east, the cities of Kashgar and Yarkand occupy the centre of the vast amphitheatre formed by the Tian-shan, the Alai-tag, the Pamir, Hindu-Kush, and the Kuen-lun. Stieler's atlas marks no less than six trade-routes over the passes of these mountains from Kashgar to the head streams of the Oxus and Sir-daria, and six from Yarkand to the Oxus and the Indus. Their position is paralleled by that of Turin, which occupies the focus of all the roads over the central, western, and Ligurian Alps, commanding thus a fine sweep from Lucerne in the north around to Savona in the south.

The location of Turin is superior to that of the central Asiatic cities mentioned above, because the passes which it commands unite the two great natural waterways found in the Rhone and the Po. The accessibility, the sphere of attraction, and hence the value of all mountain passes, is determined in large part by their connection with the natural highways which are found in river

basins. The passes of the central Asiatic highlands lose much of their importance by a lack of waterways. Of the streams draining this vast upheaved area the Oxus, Sir-daria, Chu, and Ili are lost in land-locked seas or lakes; the Tarim is soaked up by the sands of the desert, and only the Indus, which merely skirts the base of this highland on its most inaccessible side, reaches the ocean. In contrast, the Alps are flanked by the Po, the Rhone, and the Danube. The passes of the Pyrenees open on one side into the valley of the Ebro, and on the other to the Garonne, with its canal extension to the Mediterranean. The Pass of Belfort is the greatest historic highway of Europe, because it unites the deep furrows of the Rhine and the Rhone. The passes of the Alleghanies, in western Pennsylvania, lead through their pass valleys to the Ohio at its head of navigation. The Mohawk depression connects the Hudson with the inland waterway of the Great Lakes, and hence, in its historical and commercial importance, is one of the most significant natural features on the North American continent. Even the far-away Yukon serves as a highway from the northern outlets of Chilkoot and White Horse Pass to the goldfields of Dawson City and Forty Mile Creek.

As the world's roads are used primarily for commerce, pass routes rank in importance according to the amount of trade they forward, and this in turn is decided by the contrast in the lands which they unite. The passes of the Alps and the Pass of Belfort are busy thoroughfares, because they effect the exchange of the products of the tropical Mediterranean and of the temperate regions of central Europe. Or, the contrast may be one of occupation. The Mohawk depression forwards the grain of the agricultural Northwest in return for the manufactured products of the Atlantic cities. The passes of the Asiatic highlands connect the industrial lowlands of India and China with the nomad uplands of Mongolia, Afghanistan, eastern Bukhara, and Russian Turkistan. Hence they facilitate the exchange of the wool, skins, camel's hair cloth, and metal work of the wandering pastors for the manufactured goods and fine agricultural products of the sedentary populations in the fertile lowlands. Where passes offer an outlet for inland countries to the sea, their sphere of attraction, and therewith their importance, is immensely increased. San Francisco, New York, Philadelphia, Marseilles, Venice, Trieste, and Karachi are seaports which owe their importance in no small degree to the great passes back of them.

Though mountain passes are pre-eminently thoroughfares for

trade, and though the purposes of trade have lent their settlements a certain common physiognomy, nevertheless war, too, has had a hand in modifying the work of nature there in making military roads and building forts, and in giving to the history of mountain passes the element of adventure to vary the monotonous tale of trade. The final ascent to the summit of high passes is oftentimes made through wild, narrow ravines, which present the greatest difficulties to the advance of an army, and predetermine the point of bitterest aggression and defense in time of war. Such is the gorge of Valsorey leading up to St. Bernard, where Napoleon encountered the greatest difficulties in his famous passage of the Alps in May, 1800, with 30,000 men; such the gorge of Cardinel, just below the Splügen Pass, where the French army, under General Macdonald, ascending this ravine in December, 1800, was struck by an avalanche, and lost a large number of its men, who were hurled into the abyss below. When Suvaroff, in September, 1799, crossed the Alps to drive the French out of Switzerland, he came up the Ticino to the dangerous Val Tremola (6,375 ft.), where he had several sharp skirmishes with the enemy, crossed the St. Gothard, forced the passage of the Urner Loch, but had a fierce fight at the Devil's Bridge, at the lower end of the gorge, and compelled the French to retreat to Lake Lucerne. Just six weeks before the Devil's Bridge had been the scene of a battle between the Austrians and French.

The same military exploits have been enacted over and over in mountain passes. The gaps in the Hindu-Kush and the Sulaiman ranges have been traversed by the conquering forces of the early Aryans, Alexander and his Greeks, Mongols, Tartars, Persians, and English; and now the Russians are ready to descend by the same routes to the Indus. Every foot of the Khaibar Pass has been fought over repeatedly, and the Ali Musjid fort, which guards it now, has been alternately held by Afghans and English. In the pass of Roncesvalles, leading across the western Pyrenees from Pamplona to St. Etienne, fell the army of Charlemagne in 778 with the flower of his knighthood; through this valley the Black Prince in 1367 led his troops to the victory of Navarrete; up this valley in 1813 moved a division of Wellington's army, driving the French before them; and by this route Soult advanced across the frontier from France for the relief of the French forces shut up in Pamplona. In the eastern Pyrenees, the Col de la Perche saw the legions of Hannibal, of Pompey, of Cæsar climbing the mountain barrier, and the repeated advance and withdrawal of French forces in the Peninsular War.

Military needs have given a certain common physiognomy to mountain passes. Artificial defences of every kind guard the approaches to the summit. Forts, castles, watch-towers, mount the heights of almost every gap in the southern Eurasian highlands from the Bay of Biscay to the Bay of Bengal. A more archaic form of defence is found in the ruins of walls built across these natural portals. The old Caucasian wall was built across the Albanian Gates in the eastern Caucasus by the Persians as a barrier to barbarian invasion from the north, and was provided with iron gates by Harun al Rashid. Strabo says that in his day the *Pylæ Caucasie*, or Pass of Dariel, was closed by walls and gates. The Shah el Nadir, leading from the mountains of northern Persia to the plains of Turkistan, shows formidable walls to-day. The Afghans, in their recent war with England, threw temporary barriers across the Khaibar Pass to block the advance of the English. Compare Cæsar's wall and trench, nineteen miles long, which he constructed across the depression between Mt. Jura and Lake Lemman to stop the advance of the Helvetians. At the entrance to passes we find strongly fortified and garrisoned points as a base of supplies for aggression or defence in time of war. Such are Belfort, Stirling (which is the key to the Scotch Highlands); Vladikavkaz, at the entrance to the Pass of Dariel; Saverne (the Roman *Tres Tabernæ*), which defends the chief pass of the Vosges; Bayonne and Perpignan, both their fortresses the work of Vauban, which guard the eastern and western passes of the Pyrenees. Quetta, which is the chief British stronghold in the Sulaiman Mountains, is at the western outlet of the Bolan Pass, leading up from the Indus Valley; it also commands a route running west by the Kojah Pass to Kandahar, and another running north to Kabul. Some old towers standing in the vicinity of Quetta and at the entrance to the gorges attest the importance attached in all ages to this strategic position. Farther north Peshawar is the base of all military operations over the neighboring Khaibar and Paiwar Passes into Afghanistan, and northwest by the Chitral route to the passes of the Pamir.

Defensive war goes to meet the invading enemy at the frontier, and if this frontier is mountainous, the passes see the first engagements. Such was the battle of Thermopylæ. The low passes forming the outer gateways into the mountains of Switzerland have been the field of battles, small in point of the numbers engaged, but great in their significance. At Morgarten Pass, east of Lake Zug, in 1315, fourteen hundred Swiss Confederates won their first battle over their Hapsburg oppressors; and again in the same place

in 1798 the army of the Swiss Republic defeated the invading French. This spot has rightly been called the Thermopylæ of the Swiss. The battles between the Swiss and Austrians in 1386 at Sempach, which commanded an approach to Lucerne, and in 1499 at Frastanz, just south of Lake Constance, in defense of the entrance to the Upper Rhine, were of this same character. It was in the Pass of Killiecrankie that the Highland clans, supporting the deposed James II. of England, made their stand in 1689 against the army of William I. Stirling Castle, Falkirk, and Bannockburn—names great in the history of English invasion and Scotch defence—guarded the pass from the Lowlands to the Highlands.

Where the invading force succeeds in crossing the mountain barrier, it advances out of the mouth of the passes and in the plains meets the full force of the defending army—not a mere outpost, such as is often sufficient to hold a pass. Such plains, generally river valleys, from the topography of the country, become the great battle-fields of the world. It is safe to say that no other equal area on the earth has seen so many pitched battles as the valley of the Po. On its affluents, the Ticinus and the Trebia, Hannibal defeated the Roman consuls. Just west of the Ticinus at Vercellæ, Marius defeated the invading Cimbri. Five hundred years later Stilicho defeated the Goths under Alaric, who had invaded Italy by the Julian Alps, at Verona and Pollentia, two widely separated places, of which the latter commanded the entrance of the low pass south over the Ligurian Alps, now followed by the Ceva-Albenga road. In the Middle Ages, when the German Empire was trying to retain its hold on the Kingdom of Italy, the Po valley was the scene of conflicts. But this region saw its greatest conflicts when Napoleon, in May, 1800, brought his army across the Alps by the St. Bernard, the Simplon, St. Gothard, and other passes descended upon the enemy like a thunderbolt, and defeated them at Montebello and Marengo. The next few decades saw the battles of Novara, Magenta, and Solferino stain the streams of the Po. In the annals of Spain the valley of the Ebro affords a parallel to the Po in Italy. Any one who reads Napier's *History of the Peninsular War* sees that the activities in that great conflict were completely dominated by the passes of the Pyrenees. The first move on the part of the French was to seize all the Spanish piedmont, or mountain fortresses, like San Sebastian, Vitoria, Pamplona, Jaca, Figueras, and Barcelona, while the defences of Gerona were hammered at again and again to reduce that important point. Their communication with France secured by the possession of the passes,

the French moved forward to the Ebro, and then, in the eight years that followed, every foot of the Ebro from its source to the mouth was contested. When in the last period of the war the French began to give way, they made their last line of defence along the Ebro, whose waters ran blood once more. On their retreat over the passes across the frontier, the rivers of France—the Bidassoa, the upper Adour, and Garonne—repeated the history of the Ebro. Wellington's wonderful crossing of the tidal stream Bidassoa, the fall of the French cities Bayonne, Orthez, Tarbes, and Toulouse, placed the last eventful scenes of the war along these river valleys.

All mountain regions, like Afghanistan, the Caucasus, the Alps, and the Pyrenees, along whose base or over whose passes the great human tides of migration, trade, and war have poured, contain a motley assemblage of races, languages, dialects, customs and institutions in apparently hopeless confusion, in which, however, the anthropogeographer is able to detect an orderly arrangement. Especially is this true in the passes which have played a great part in ethnic and linguistic distribution. The fair and red-haired Teutonic type of Switzerland, limited in general by the crest of the Bernese Oberland and the Todi chain, extends south of this line in a broad but shallow wedge to the summit of the St. Gothard and Furka passes, while just beyond begins the dark Italian type and Italian speech. The Brenner, too, carries the German speech and greater height of the Teutons well over into the Adige valley as far as Bozen, where the stunted type of Mediterranean people and Italian speech begin. The lowlands on either side of the Alps are inhabited by two distinct long-headed races, the summits and remote upland valleys by the broad-headed Alpine race; the people of the pass show a cranial index intermediate between the two, indicating the intermixture of races which has taken place along this thoroughfare. The inhabitants of the Brenner are pretty much alike from Innsbruck to Bozen in cranial index, stature, coloring, and language; but remote side valleys show the unmixed Alpine race with every variety of dialect, custom, and social institution.

The passes of other mountain ranges have the same ethnic story to tell. The Pass of Belfort connects the tall, blond Germans of the Rhine with a long, narrow area of this same type, extending through this depression and down the Rhine to Marseilles and dividing two wider sections of the short, dark Alpine race. It has also exerted a marked influence on the natural history of Europe; it was the only route by which the southern flora and fauna could reach the north, since they could not cross the Alps. The two

extremities of the Pyrenees, where, as we have seen, are the best passes, show the same race of inhabitants on both the slopes. The province of Roussillon, in southern France, which commands the eastern routes to Spain, was annexed to France only in 1659. Its capital, Perpignan, in plan and architecture, is semi-moresque; and the inhabitants, in physiognomy, language, and dress resemble the neighboring Catalonians in Spain. At the other end of the Pyrenees, the Basques, whose predominantly long-headed type seems to point to their origin in Spain, occupy both slopes of the mountains; but the broad-headed Alpine race, native to southwestern France, has sent a deep wedge of its broad-headed type up the valley of the Nive and over the Pass of Roncesvalles as far as Pamplona, displacing the cranial index of the Basques, but adopting their language. In the Caucasus, the Ossetes, who hold the Pass of Dariel, are the only tribe occupying both slopes. The pass city Tiflis, at the crossroads of the two great routes between Europe and Asia, has been called the "precipitate of history." Prof. Brusch reckons seventy different languages spoken there. The great pass cities of central Asia, like Bukhara, Merv, and Tashkent, show the same feature of mixed population, embracing representatives from every country of Asia and from many of Europe, including always the ubiquitous Jew.

Those points on the earth's surface which attract the chief activities of man—travel, territorial expansion, migration, war, and commerce—must early assume political importance. Tribes inhabiting mountain passes have always been able to exert a political influence out of proportion to their size and strength; and they have also been the object of conquest by the people of the lowland. Entrenched in their mountain fastnesses, however, they have always been able to give the invaders plenty to do before the conquest has been accomplished. An old Persian proverb says: "If the Shah is too mighty, let him only make war on the Caucasus." Such mountain tribes have always exploited the advantages of their position by levying tolls. Cæsar describes a certain expedition he sent out under the command of his lieutenant to reduce three mountain tribes whose territories extended from Lake Geneva and the Upper and Middle Rhone to the summits of the Alps, and who controlled the passes traversed by the Roman merchants, *magnis portoriis et magno cum periculo*. The southern slopes of these mountains were occupied anciently by the Salassi, a Celtic tribe, who inhabited the valley of the Upper Dora Baltea and Buttier, and hence commanded the passage of the Great and Little St. Bernard,

the two most important routes from Italy to Gaul. They frequently harassed the Romans, and on one occasion plundered the coffers of Cæsar himself. After a protracted struggle this tribe was exterminated by Augustus, who founded Aosta to protect the high-roads and garrisoned it with 3,000 soldiers of the Prætorian cohorts. The Afghan tribes in the passes of the Sulaiman Mountains have been accustomed to impose high transit taxes upon traders traversing those routes between western Afghanistan and India. The travellers, therefore, organize themselves into bands of hundreds, or even thousands, as protection against attack or exorbitant exactions. The Afridis have always enforced their right to impose tolls in the Khaibar and Kohat passes. Since 1880 the English have paid them a yearly sum to keep these roads open.

Mountain regions, because of their passes, are great natural transition lands, and as such have always been the object of acquisition by neighbouring powers having designs on the country beyond. They have, therefore, assumed a peculiar political character, and have been the subject of a distinct political policy, which is only to-day recognized in its full significance—since the development of the national-empire idea and its consequent territorial expansion. This policy dictates the acquisition, not, as heretofore, of a mere border range as a frontier, but of a whole mountain region. In the military operations against the chief objective in the country beyond, the rugged highlands, with their passes, form the line of communication with the rear. It is of vital importance that this line, necessarily long, difficult, and easily obstructed at its passes, should be put beyond the chance of interruption. The whole mountain country, therefore, must be conquered. The conquest, though long drawn out, because of the independent spirit and intrenched position of the upland tribes, is a foregone conclusion. The sparsity of the highland population, their tendency, geographically determined, to form small, isolated valley States, and their lack of cohesion, make their eventual defeat certain. The small States of the Pamir, Roshan, Machan, and Shugnan have lost their independence to Russia; Afghanistan, the Chitral, and Kashmir to England. Only where the sense of danger, combined with an advanced civilization, overcomes the tendency towards disunion, as is the case of the Swiss, do we find a mountain people successfully maintaining an independent State. The Alps succumbed to ancient Rome, the Tyrol to the early German Empire. Napoleon I. conquered Switzerland, and began constructing military roads over the chief passes to Italy. By the second Afghan War, the Amir became

a feudatory of the British Crown, which gained control of the foreign relations of Afghanistan, and also of its great pass routes—the Khaibar, Kohat, Kuram, and the Bolan—to Kandahar.

In all of the cases cited, military or political exigencies pointed out the necessity of securing these transition lands; but, in the history of our own country, we have an instance of the occupation of such mountain districts purely as the result of the long-sighted prevision of America's first expansionist. The man was Gov. Spotswood, of Virginia. In his time the tide-water marked the limit of English settlement. Between that and the foot of the Blue Ridge lay a fifty-mile zone of unbroken forest. The beyond was unknown. All the Mississippi valley was claimed by the French, who, in order to hold it, were pushing the construction of a line of forts, reaching from New Orleans up to Detroit and Fort Duquesne. Rumors of these activities reached Gov. Spotswood, and his mind was disturbed by the cordon the French were drawing around the English settlement. So in 1716, by way of example, apparently, he made his famous expedition across the Blue Ridge by Swift Run Gap, from the headwaters of the Rapidan into the Shenandoah Valley, of which he took formal possession in the name of the King. In his letters to the Lords of Trade regarding this expedition, he explains the power of the French settlements of the interior to monopolize the fur trade and also to threaten the English plantations in the rear. And then he adds:

Nature, 'tis true, has formed a Barrier for us by that long Chain of Mountains w'ch run from the back of South Carolina as far as New York, and w'ch are only passable in some few places, but even that Natural Defence may prove rather destructive to us, if they are not possessed by us before they are known by them.

Then he recommends that, while it is yet possible, the English should make some settlements on the Great Lakes, and at the same time possess themselves of those passes of the mountains which should be necessary to preserve communication with such settlements.

The passes to and through such highlands are always the great objective. When a mountain State has effectively maintained its independence—as Switzerland has—and is conscious that its political importance is due to the roads it controls, it aims at the complete command of the entrances to its passes. Switzerland has succeeded in shutting Italy out from all her southern passes except the Great St. Bernard and the Splügen. The exclusive command of the St. Gothard route from lowland to lowland is secured by the wedge of Swiss territory which is driven down into Italy almost to

the plains of the Po. The same politico-geographical phenomenon is repeated just farther east in the southern approaches of the Brenner, again at the cost of Italy. But politico-geographical history in Europe has become old and staid, whereas in Asia it is only in process of making. In Asia, therefore, the evolution of the peculiar political character of these barrier areas is proceeding rapidly before our eyes. In this process Russia is the great factor, as a glance at the Russian frontier will show. To the political geographer the map of the Russian frontier in Asia is eloquent. Its distinguishing features are four great bulges, not so very pronounced when viewed in relation to the whole vast stretch of the Russian Empire; but when seen in detail and in relation to the topography, their significance becomes important. All four of these bulges have to do with mountain areas, and the accession of the territory has immediately been followed by the construction of a railroad—a fact which attests the importance which Russia herself attaches to the acquisition.

The only points at which the Russian territory extends south of the critical fortieth parallel are in Trans-Caucasus, Trans-Caspia, and the Pamir—all of them acquisitions of the past twenty-three years. The conquest of the Caucasus is geographically a conquest from Asia. Begun a hundred years ago, the frontier has been protruded, with slight interruption, southward over the Great Caucasus, the Anti-Caucasus, the Kazil-dagh (mean altitude 10,460 ft.), and to the still higher range forming the watershed between the Araxes and the Murad, the head-stream of the Euphrates. That name contains the climax of Muscovite expansion here. Along the Araxes basin three Powers converge—Persia, Turkey, and Russia; but Russia holds the lion's share, together with the best strategic points for descent on the Euphrates. Her outpost city is Kars, recently connected by railroad with Tiflis and with the port of Batum, on the Black Sea. Russia's objective is a port on the Persian Gulf, the commercial advantage of which would be enormous; on the political side, it would enable her to threaten the London-Calcutta highway in the flank. She is stamping upon the Armenian plateaux, therefore, the character of a political passway to the Euphrates, by which she hopes some day to reach the sea. If thwarted in this endeavor, she will utilize Afghanistan or Persia, and to this end is incidentally trying to gain ascendancy in the councils of the Shah.

This brings us to the second bulge in Russia's frontier. The first stretch of the Trans-Caspian railroad was built, after the con-

quest of this region in 1881, along the foot of the Hasar Meshid mountains, which form the northern border of Persia; and Askabad, because of its proximity to the Persian frontier and the carriage-road thence one hundred and seventy miles over the mountains to Meshed, was made the military headquarters of Turkistan, and provided with a strong garrison and abundant stores of every kind on a war footing. Meshed is connected by a road two hundred miles long with Herat, and is the chief city of Khorassan Province, over which Russia seems to have established an indefinite but convenient protectorate. Khorassan may prove a possible passway to the Persian Gulf; but if that fails the Russians have still the Gates of Herat. The Afghan-Russian frontier line, accepted by Russia in 1872, had its termini at Sarakhs at the north-east corner of Persia, on the Heri-Rud, and at Khoja Saleh, on the Oxus, directly east of Merv. In political documents and speeches this was assumed as the boundary till 1882, when the Paropamisus gap was discovered by a Russian explorer. In March, 1884, Merv was conquered, and then began the advance on the Gates of Herat along two lines—one from Sarakhs up the Heri-Rud, ending in the occupation of the Zulfikar Pass, the Robat Pass, and other avenues to Herat; the other from Merv up the Murghab river, which irrigates the Merv oasis, to the town of Penjdeh, which commands the approach to a much-used trade route over the eastern Paropamisus, here 8,000 ft. high, by the Pass of Hasret-i-Baba (6,400 ft.), straight to Herat. The English frontier survey commission, appointed finally to investigate the Russo-Afghan boundary, left the Muscovites in possession of the hundred and twenty miles of country they had occupied. To-day, south from Merv runs the famous Murghab branch of the Trans-Caspian Railroad for a hundred and ninety miles along the Murghab river to Kushkinski Post, on the frontier of Afghanistan, only about thirty miles from the fortress of Kushk, which guards the northern outlet of the Hasret-i-Baba Pass, and eighty miles from Herat. This is a purely strategical and military line, and is kept absolutely secret. No permission to travel on it has ever been granted to a foreigner. It is not difficult to foretell the history that will be made some day in the passes of the Paropamisus.

The next bulge in the Russian boundary is formed by the rectangle of the Pamir, which seems to have been attached by one of its corners, thus forming a very erratic frontier. The Pamir is approached by the Oxus, which Russia controls, and which by its two head-streams exactly embraces the plateau. By this acquisition,

therefore, Russia holds a strategic position for descent through its passes to northern India, or to the Tarim basin of Chinese Turkistan, with its cities of Kashgar and Yarkand. On the northern border, Russia's position is still more significant. An eastern branch of the Trans-Caspian Railroad to Margljan (2,000 ft.), in Fergana, brings Russia very near to the Tarim, for by the Terek Pass her forces can drop down from the wall of the Tian-shan into the valley of Kashgaria.

The next bulge is much more important, though much more slight; but the evidence seems to indicate that the eastward protrusion of the frontier towards the passes of the Dzungaria is only begun. It is evidently aimed at Kulja, where converge all the routes from the west to join the great imperial road of China. Now Russia demands the protectorate over Mongolia and Chinese Turkistan, for which she has been preparing her routes of communication. The main line of the Trans-Caspian Railroad runs at present only to Tashkent; but its extension to Kulja will undoubtedly be a thing of the near future.

The advance of the Russian frontier towards Afghanistan immediately succeeded a similar movement of the British in India towards strategic points to the west. India's western frontier shows a decided bulge into Afghan territory, with its apex pointed towards Kandahar, whose strategic value we have seen. Here, too, as in the case of Russia, the railroad has followed on the heels of the advance. The wedge driven westward and northward up the valley of the Chitral to the base of the Hindu-Kush in 1895 was a counter-movement, called for by Russia's occupation of the Pamir. Newspaper generals and parliamentary speakers of the time declared the Chitral a strategical position of doubtful importance, and set forth at length the impossibility of any attack from the north. But the Indian officers on the ground concluded that if Russia found it worth while to be on the Pamir side of the Hindu-Kush passes, it was at least expedient for England to be stationed at the southern entrances to the same. Thus even the "Roof of the World" has gained a political importance strangely at variance with its scantiness of resources and sparsity of population.

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GEOGRAPHICAL BOUNDARIES—I.*

BY

ELLEN CHURCHILL SEMPLE.

Nature abhors fixed boundary lines and sudden transitions; all her forces combine against them. Everywhere she keeps her borders melting, wavering, advancing, retreating. If by some cataclysm sharp lines of demarcation are drawn, she straightway begins to blur them by creating intermediate forms, and thus establishes the boundary zone which characterizes the inanimate and animate world. A stratum of limestone or sandstone, when brought into contact with a glowing mass of igneous rock, undergoes various changes due to the penetrating heat of the volcanic outflow, so that its surface is metamorphosed as far as that heat reaches. The granite cliff slowly deposits at its base a rock-waste slope to soften the sudden transition from its perpendicular surface to the level plain at its feet. The line where a land-born river meets the sea tends to become a sandbar or a delta, created by the river-borne silt and the wash of the waves, a form intermediate between land and sea, bearing the stamp of each, fluid in its outlines, ever growing by the persistent accumulation of mud, though ever subject to inundation and destruction by the waters which made it. The alluvial coastal hems that edge all shallow seas are such border zones, reflecting in their flat, low surfaces the dead level of the ocean, in their composition the solid substance of the land; but in the miniature waves imprinted on the sands and the billows of heaped-up boulders, the master workman of the deep leaves his trademark.

* This article is a chapter from a work in preparation on the Influences of Geographic Environment, based upon Friedrich Ratzel's System of Anthropogeography.

Under examination, even our familiar term coastline proves to be only an abstraction with no corresponding reality in nature. Everywhere, whether on margin of lake or gulf, the actual phenomenon is a coast zone, alternately covered and abandoned by the waters, varying in width from a few inches to a few miles, according to the slope of the land, the range of the tide and the direction of the wind. It has one breadth at the minimum or neap tide, but increases often two or three fold at spring tide, when the distance between ebb and flood is at its maximum. At the mouth of Cook's Inlet on the southern Alaskan coast, where the range of tides is only eight feet, the zone is comparatively narrow, but widens rapidly towards the head of the inlet, where the tide rises twenty-three feet above the ebb line, and even to sixty-five feet under the influence of a heavy southwest storm. On flat coasts we are familiar with the wide frontier of salt marshes, that witness the border warfare of land and sea, alternate invasion and retreat. In low-shored estuaries like those of northern Brittany and northwestern Alaska, this amphibian girdle of the land expands to a width of four miles, while on the precipitous coasts of enclosed sea basins it contracts to a few inches. Hence this boundary zone changes with every impulse of the mobile sea and with every varying configuration of the shore. Movement and external conditions are the factors in its creation. They make something that is only partially akin to the two contiguous forms. Here on their outer margins land and ocean compromise their physical differences, and this by a law which runs through animate and inanimate nature. Wherever one body comes into constant contact with another, it is subjected to modifying influences which differentiate its periphery from its interior, lend it a transitional character, make of it a penumbra between light and shadow. The modifying process goes on persistently with varying force and creates a shifting, changing border zone which, from its nature, cannot be delimited. For convenience' sake, we adopt the abstraction of a boundary line; but the reality behind this abstraction is the important thing in anthropogeography.

All so-called boundary lines with which geography has to do have this same character,—coastlines, river margins, ice or snow lines, limits of vegetation, boundaries of races or religions or civilizations, frontiers of states. They are all the same, stamped by the eternal flux of nature. Beyond the solid ice-pack which surrounds the North Pole is a wide girdle of almost unbroken drift ice, and beyond this is an irregular concentric zone of scattered icebergs which varies in breadth with season, wind and local current; a

persistent decrease in continuity from solid pack to open sea. The line of perpetual snow on high mountains advances or retreats from season to season, from year to year; it drops low on chilly northern slopes and recedes to higher altitudes on a southern exposure; sends down long icy tongues in dark gorges, and leaves outlying patches of old snow in shaded spots or beneath a covering of rock waste far below the margin of the snow fields.

In the struggle for existence in the vegetable world, the tree line pushes as far up the mountain as conditions of climate and soil will permit. Then comes a season of fiercer storms, intenser cold and invading ice upon the peaks. Havoc is wrought, and the forest drops back across a zone of border warfare—for wars belong to borders—leaving behind it here and there a dwarfed pine or gnarled and twisted juniper which has survived the onslaught of the enemy. Now these are stragglers in the retreat, but are destined later in milder years to serve as outposts in the advance of the forest to recover its lost ground. Here we have a border scene which is typical in nature—the belt of unbroken forest growing thinner and more stunted towards its upper edge, succeeded by a zone of scattered trees, which may form a cluster perhaps in some sheltered gulch where soil has collected and north winds are excluded, and higher still the whitened skeleton of a tree to show how far the forest once invaded the domain of the waste.

The habitable area of the earth everywhere shows its boundaries to be peripheral zones of varying width, now occupied and now deserted, protruding or receding according to external conditions of climate and soil, and subject to seasonal change. The distribution of human life becomes sparser from the temperate regions towards the Arctic Circle, foreshadowing the unpeopled wastes of the ice-fields beyond. The outward movement from the tropics poleward halts where life conditions disappear, and there finds its boundary; but as life conditions advance or retreat with the seasons, so does that boundary. On the west coast of Greenland the Eskimo village of Etah, at about the seventy-eighth parallel, marks the northern limit of permanent or winter settlement; but in summer the Eskimo, in his kayak, follows the musk-ox and seal much farther north and there leaves his igloo to testify to the wide range of his poleward migration. Numerous relics of the Eskimo and their summer encampments have been found along Lady Franklin Bay in northern Grinnell Land (81° 50' N. L.), but in the interior, on the outlet stream of Lake Hazen, explorers have discovered remains of habitations which had evidently, in previous ages, been perma-

nently occupied.* The Murman Coast of the Kola Peninsula has, in summer, a large population of Russian fishermen and forty or more fishing stations; but when the catch is over at the end of August, and the Arctic winter approaches, the stations are closed, and the three thousand fishermen return to their permanent homes on the shores of the White Sea.†

An altitude of about five thousand feet marks the limit of village life in the Alps; but during the three warmest months of the year, the summer pastures at eight thousand feet or more are alive with herds and their keepers. The boundary line of human life moves up the mountains in the wake of spring and later hurries down again before the advance of winter. The Himalayan and Karakorum ranges show whole villages of temporary occupation, like the summer trading town of Gartok at 15,000 feet on the caravan route from Leh to Lhasa, or Shahidula (3,285 meters or 10,925 feet) on the road between Leh and Yarkand;‡ but the boundary of permanent habitation lies several thousand feet below. Comparable to these are the big hotels that serve summer stage-coach travel over the Alps and Rockies, but which are deserted when the first snow closes the passes. Here a zone of altitude, as in the polar regions a zone of latitude, marks the limits of the habitable area.

Such boundaries mark the limits of that movement which is common to all animate things. Every living form spreads until it meets natural conditions in which it can no longer survive, or until it is checked by the opposing expansion of some competing form. If there is a change either in the life conditions or in the strength of the competing forms, the boundary shifts. In the propitious climate of the Genial Period, plants and animals lived nearer to the North Pole than at present; then they fell back before the advance of the ice sheet. The restless surface of the ocean denies to man a dwelling place; every century, however, the Dutch are pushing forward their northern boundary by reclamation of land from the sea; but repeatedly they have had to drop back for a time when the water has again overwhelmed their hand-made territory. The boundaries of race and state which are subject to greatest fluctuations are those determined by the resistance of other peoples. The westward sweep of the Slavs prior to the 8th century carried them beyond the Elbe; but as the Germans increased in numbers, outgrew their narrow ter-

* A. W. Greely, Report of the Lady Franklin Bay Expedition, Vol. 1, pp. 28-33, 236. Misc. Doc. No. 393. Washington, 1888.

† A. P. Engelhardt, *A Russian Province of the North*, pp. 123-130. Translated from the Russian, London, 1899.

‡ Col. Francis E. Younghusband, *The Heart of a Continent*, pp. 194-199. London, 1904.

ritories and inaugurated a counter-movement eastward, the Slavs began falling back to the Oder, to the Vistula, and finally to the Niemen. Though the Mohawk valley opened an easy avenue of expansion westward for the early colonists of New York, the advance of settlements up this valley for several decades went on at only a snail's pace, because of the compact body of Iroquois tribes holding this territory, while in the unoccupied land farther south between the Cumberland and Ohio rivers the frontier went forward with leaps and bounds, pushed on by the expanding power of the young Republic.

Anything which increases the expanding force of a people—the establishment of a more satisfactory government by which the national consciousness is developed, as in the American and French revolutions, the prosecution of a successful war by which popular energies are released from an old restraint, mere increase of population, or an impulse communicated by some hostile and irresistible force behind—all are registered in an advance of the boundary of the people in question and a corresponding retrusion of their neighbour's frontier.

The border district is the periphery of the growing or declining race or state. It runs the more irregularly, the greater are the variations in the external conditions as represented by climate, soil, barriers, and natural openings, according as these facilitate or obstruct advance. When it is contiguous with the border of another state or race, the two form a wide zone in which ascendancy from one side or the other is being established. The boundary fluctuates, for equilibrium of the contending forces is established rarely and for only short periods. The more aggressive people throws out across this debatable zone, along the lines of least resistance or greatest attraction, long streamers of occupation; so that the frontier takes on the form of a fringe of settlement, whose interstices are occupied by a corresponding fringe of the displaced people. Such was its aspect in early colonial America, where population spread up every fertile river valley across a zone of Indian land; and such it is in northern Russia to-day, where long narrow Slav bands run out from the area of continuous Slav settlement across a wide belt of Mongoloid territory to the shores of the White Sea and Arctic Ocean.*

The border zone is further broadened by the formation of ethnic islands beyond the base line of continuous settlement, which then advances more or less rapidly, if expansion is unchecked, till it coalesces with these outposts, just as the forest line on the moun-

* Anatole Leroy-Beaulieu, *The Empire of the Tzars*, Vol. 1, *Ethnographical Map*. New York, 1893.

tains may reach, under advantageous conditions, its farthest outlying tree. Such ethnic peninsulas and islands we see in the early western frontiers of the United States from 1790 to 1840, when that frontier was daily moving westward.*

The breadth of the frontier zone is indicative of the activity of growth on the one side and the corresponding decline on the other, because extensive encroachment in the same degree disintegrates the territory of the neighbour at whose cost such encroachment is made. A straight, narrow race boundary, especially if it is nearly coincident with a political boundary, points to an equilibrium of forces which means, for the time being at least, a cessation of growth. Such boundaries are found in old, thickly populated countries, while the wide, ragged border zone belongs to new, and especially to colonial, peoples. In the oldest and most densely populated seats of the Germans, where they are found in the Rhine valley, the boundaries of race and empire are straight and simple; but the younger, eastern border, which for centuries has been steadily advancing at the cost of the unequally matched Slavs, has the ragged outline and sparse population of a true colonial frontier. Between two peoples who have had a long period of growth behind them, the oscillations of the boundary decrease in amplitude, as it were, and finally approach a state of rest. Each people tends to fill out its area evenly; every advance in civilization, every increase of population, increases the stability of their tenure, and hence the equilibrium of the pressure upon the boundary. Therefore, in such countries, racial, linguistic and cultural boundaries tend to become simpler and straighter.

The growth is more apparent, or, in other words, the border zone is widest and most irregular, where a superior people intrudes upon the territory of an inferior race. Such was the broad zone of thinly scattered farms and villages amidst a prevailing wilderness and hostile Indian tribes which, in 1810 and 1820, surrounded our trans-Allegheny area of continuous settlement in a one to two hundred mile wide girdle. Such has been the wide, mobile frontier of the Russian advance in Siberia and until recently in Manchuria, which aimed to include within a dotted line of widely separated railway guard stations, Cossack barracks, and penal colonies, the vast territory which later generations were fully to occupy. Similar, too, is the frontier of the Dutch and English settlements in South Africa, which has been pushed forward into the Kaffir country—a broad belt of scattered cattle ranches and isolated mining hives, dropped down amidst Kaffir hunting and grazing lands. Broader still was that shadowy

* Eleventh Census of the United States, Population, Part I, maps on pp. xviii-xxiii.

belt of American occupation which for four decades immediately succeeding the purchase of Louisiana stretched in the form of isolated fur-stations, lonely trappers' camps, and shifting traders' *rendezvous* from the Mississippi to the western slope of the Rockies and the northern watershed of the Missouri, where it met the corresponding nebulous outskirts of the far-away Canadian state on the St. Lawrence River.

The untouched resources of such new countries tempt to the widespread superficial exploitation, which finds its geographical expression in a broad, dilating frontier. Here the man-dust which is to form the future political planet is thinly disseminated, swept outward by a centrifugal force. Furthermore, the absence of natural barriers which might block this movement, the presence of open plains and river highways to facilitate it, and the predominance of harsh conditions of climate or soil rendering necessary a savage, extensive exploitation of the slender resources, often combine still further to widen the frontier zone. This was the case in French Canada and till recent decades in Siberia, where intense cold and abundant river highways stimulated the fur trade to the practical exclusion of all other activities, and substituted for the closely-grouped, sedentary farmers with their growing families the wide-ranging trader with his Indian or Tunguse wife and his half-breed offspring. Under harsh climatic conditions, the fur trade alone afforded those large profits which every infant colony must command in order to survive; and the fur trade meant a wide frontier zone of scattered posts amidst a prevailing wilderness. The French in particular, by the possession of the St. Lawrence and Mississippi Rivers, the greatest systems in America, were lured into the danger of excessive expansion, attenuated their ethnic element, and failed to raise the economic status of their wide border district, which could therefore offer only slight resistance to the spread of solid English settlement.* Yet more recently, the chief weakness of the Russians in Siberia and Manchuria—apart from the corruption of the national government—was the weakness of a too remote and too sparsely populated frontier, and of a people whose inner development had not kept pace with their rate of expansion.

Wasteful exploitation of a big territory is easier than the economical development of a small district. This is one line of least resistance which civilized man as well as savage instinctively follows, and which explains the tendency towards excessive expansion characteristic of all primitive and nascent peoples. For such peoples

*Fully treated in E. C. Semple, *American History and Its Geographic Conditions*, pp. 22-31. Boston, 1903.

natural barriers which set bounds to this expansion are of vastly greater importance than they are for mature or fully developed peoples. The reason is this: the boundary is only the expression of the outward movement or growth, which is nourished from the same stock of race energy as is the inner development. Either carried to an excess weakens or retards the other. If population begins to press upon the limits of subsistence, the acquisition of a new bit of territory obviates the necessity of applying more work and more intelligence to the old area, to make it yield subsistence for the growing number of mouths; the stimulus to adopt better economic methods is lost. Therefore, natural boundaries drawn by mountain, sea and desert, serving as barriers to the easy appropriation of new territory, have for such peoples a far deeper significance than the mere determination of their political frontiers by physical features, or the benefit of protection.

The land with the most effective geographical boundaries is a naturally defined region like Corea, Japan, Australia, Egypt, Italy, Spain, France or Great Britain—a land characterized not only by exclusion from without through its encircling barriers, but also by the inclusion within itself of a certain compact group of geographic conditions, to whose combined influences the inhabitants are subjected and from which they cannot readily escape. This aspect is far more important than the mere protection which such boundaries afford. They are not absolutely necessary for the development of a people, but they give it an early start, accelerate the process, and bring the people to an early maturity; they stimulate the exploitation of all the local geographic advantages and resources, the formation of a vivid tribal or national consciousness and purpose, and concentrate the national energies when the people is ready to overleap the old barriers. The early development of island and peninsula peoples and their attainment of a finished ethnic and political character are commonplaces of history. The stories of Egypt and Greece, of Great Britain and Japan, illustrate the stimulus to maturity which emanates from such confining boundaries. The wall of the Appalachians narrowed the westward horizon of the early English colonies in America, guarded them against the excessive expansion which was undermining the French dominion in the interior of the continent, set a most wholesome limit to their aims, and thereby intensified their utilization of the narrow land between mountains and sea. France, with its limits of growth indicated by the Mediterranean, Pyrenees, Atlantic, Channel, Vosges, Jura and Maritime Alps, found its period of adolescence shortened and, like Great Britain, early

reached its maturity. Nature itself set the goal of its territorial expansion, and by crystallizing the political ideal of the people, made that goal easier to reach, just as the dream of "United Italy" realized in 1870 had been prefigured in contours drawn by Alpine range and Mediterranean shore-line.

The area which a race or people occupies is the resultant of the expansive force within and the obstacles without, either physical or human. Insurmountable physical obstacles are met where all life conditions disappear, as on the borders of the habitable world where man is separated from the unpeopled wastes of polar ice fields and unsustaining oceans. The frozen rim of arctic lands, the coastline of the continents, the outermost arable strip on the confines of the desert, the barren or ice-capped ridge of high mountain range, are all such natural boundaries which set more or less absolute limits to the movement of peoples and the territorial growth of states. The sea is the only absolute boundary, because it alone blocks the continuous, unbroken expansion of a people. When the Saxons of the lower Elbe spread to the island of Britain, a band of unpeopled sea separated their new settlements from their native villages on the mainland. Even the most pronounced land barriers, like the Himalayas and Hindu Kush, have their passways and favoured spots for short summer habitation where the people from the opposite slopes meet and mingle for a season. Sandy wastes are hospitable at times. When the spring rains on the mountains of Abyssinia start a wave of moisture lapping over the edges of the Nubian desert, it is immediately followed by a tide of Arabs with their camels and herds, who make a wide zone of temporary occupation spread over the newly created grassland, but who retire in a few weeks before the desiccating heat of summer.*

Nevertheless, all natural features of the earth's surface which serve to check, retard or weaken the expansion of peoples, and therefore hold them apart, tend to become racial or political boundaries; and all present a zone-like character. The wide ice-fields of the Scandinavian Alps were an unpeopled waste long before the political boundary was drawn along it. "It has not in reality been a definite natural *line* that has divided Norway from her neighbour on the east; it has been a *band* of desert land, up to hundreds of miles in width. So utterly desolate and apart from the area of continuous habitation has this been, that the greater part of it, the district north of Trondhjem, was looked upon even as recently as the last century as a common district. Only nomadic Lapps wandered about in it,

* Sir S. W. Baker, *The Nile Tributaries of Abyssinia*, pp. 88, 128-129, 135. Hartford, 1868.

sometimes taxed by all three countries. A parcelling out of this desert common district was not made toward Russia until 1826. Towards Sweden it was made in 1751.”*

Any geographical feature which, like this, presents a practically uninhabitable area, forms a scientific boundary, not only because it holds apart the two neighbouring peoples and thereby reduces the contact and friction which might be provocative of hostilities, but also because it lends protection against attack. This motive, as also the zone character of all boundaries, comes out conspicuously in the artificial border wastes surrounding primitive tribes and states in the lower status of civilization. The early German tribes depopulated their borders in a wide girdle, and in this wilderness permitted no neighbours to reside. The width of this zone indicated the valour and glory of the state, but was also valued as a means of protection against unexpected attack.† Similarly Xenophon found that the Armenian side of the river Kentrites, which formed the boundary between the Armenian plains and the highlands of Karduchia, was unpeopled and destitute of villages for a breadth of fifteen miles, from fear of the marauding Kurds.‡ In the eastern Sudan, especially in that wide territory along the Nile-Congo watershed occupied by the Zandeh, Junker found the frontier wilderness a regular institution owing to the exposure of the border districts in the perennial intertribal feuds.§ The vast and fertile region defined by the Ohio and Tennessee rivers, lay as a debatable border between the Algonquin Indians of the north and the Appalachians of the south. Both claimed it, both used it for hunting, but neither dared dwell therein.|| Similarly the Cherokees had no definite understanding with their savage neighbours as to the limits of their respective territories. The effectiveness of their claim to any particular tract of country usually diminished with every increase of its distance from their villages. The consequence was that a considerable strip of territory between the settlements of two tribes, Cherokees and Creeks for instance, though claimed by both, was practically considered neutral ground and the common hunting ground of both.¶ The Creeks, whose most western villages from 1771 to 1798 were

* Norway, Official Publication for the Paris Exhibition, 1900, pp. 3-4 and map. Christiania, 1900.

† Caesar, *De Bello Gallico*, Book IV, Chap. 3, and Book VI, Chap. 23.

‡ Grote, *History of Greece*, Vol. IX, Chap. 70, pp. 99, 115. New York, 1859.

§ Dr. Wilhelm Junker, *Travels in Africa*, pp. 18, 45, 79, 87, 115, 117, 138, 191, 192, 200, 308, 312, 325, 332. Translated from the German. London, 1892.

|| Theodore Roosevelt, *The Winning of the West*, Vol. 1, pp. 50, 70, 135. New York, 1895.

¶ C. C. Royce, *The Cherokee Nation of Indians*, p. 140. Fifth Annual Report of the Bureau of Ethnology. Washington, 1884.

located along the Coosa and upper Alabama rivers,* were separated by 300 miles of wilderness from the Chickasaws to the northwest, and by a 150-mile zone from the Choctaws. The most northern Choctaw towns, in turn, lay 160 miles to the south of the Chickasaw nation, whose compact settlements were located on the watershed between the western sources of the Tombigby and the head stream of the Yazoo.† The wide intervening zone of forest and canebrake was hunted upon by both nations.‡

Sometimes the border is preserved as a wilderness by formal agreement. A classic example in this case is found in the belt of untenanted land, fifty to ninety kilometers wide, which China and Korea once maintained as their boundary. No settler from either side was allowed to enter and all travel across the border had to use a single passway, where three times annually a market was held.§ On the Russo-Mongolian border south of Lake Baikal, the town of Kiakhtha, which was established in 1688 as an entrepôt of trade between the two countries, is occupied in its northern half by Russian factories and in its southern by the Mongolian-Chinese quarters, while between the two is a neutral space devoted to commerce.||

These border wastes do not always remain empty, however, even when their integrity is respected by the two neighbouring tribes whom they serve to divide; alien races often intrude into their unoccupied reaches. The boundary wilderness between the Sudanese states of Wadai and Dar Fur harbours several semi-independent villages whose insignificance is a guarantee of their safety from conquest. Similarly in the wide border district between the Creeks on the east and the Choctaws on the west were found typical small, detached tribes—the Chatots and Thomez of forty huts each on the Mobile River, the Tensas tribe with a hundred huts on the Tensas River, and the Mobilians near the confluence of the Tombigby and Alabama.¶ Along the desolate highland separating Norway and Sweden the nomadic Lapps, with their reindeer herds, have penetrated southward to 62° North Latitude, reinforcing the natural barrier by another barrier of alien race. From this point southward, the coniferous forests begin and continue the border waste in

* Albert J. Pickett, *History of Alabama*, pp. 79-89, 113-115. 1851. Reprint, Birmingham, 1900. James Adair, *History of American Indians*, p. 257. London, 1775.

† *Ibid.*, pp. 282, 352-3.

‡ Albert J. Pickett, *History of Alabama*, pp. 133-135. 1851. Reprint, Birmingham, 1900.

§ Archibald Little, *The Far East*, p. 249. Oxford, 1905.

¶ M. Huc, *Travels in Tartary, Thibet and China, 1844-1846*, Vol. 1, p. 74. Translated from the French. Reprint. Chicago, 1898.

¶ Albert J. Pickett, *History of Alabama*, pp. 118-119. 1857. Reprint, Birmingham, 1900.

the form of a zone some sixty miles wide; this was unoccupied till about 1600, when into it slowly filtered an immigration of Finns, whose descendants to-day constitute an important part of the still thin population along the frontier to the heights back of Christiania. Only thirty miles from the coast does the border zone between Norway and Sweden, peopled chiefly by intruding foreign stocks, Lapps and Finns, contract and finally merge into the denser Scandinavian settlements.*

Where the border waste offers favourable conditions of life and the intruding race has reached a higher status of civilization, it multiplies in this unpeopled tract and soon spreads at the cost of its less advanced neighbours. The old No Man's Land between the Ohio and Tennessee was a line of least resistance for the expanding Colonies, who here poured in a tide of settlement between the northern and southern Indians, just as later other pioneers filtered into the vague border territory of weak tenure between the Choctaws and Creeks, and there on the Tombigby, Mobile and Tensas rivers, formed the nucleus of the State of Alabama.†

This untenanted hem of territory surrounding so many savage and barbarous peoples reflects their superficial and unsystematic utilization of their soil, by reason of which the importance of the land itself and the proportion of population to area are greatly reduced. It is a part of that uneconomic and extravagant use of the land, that appropriation of wide territories by small tribal groups, that characterizes the lower stages of civilization, as opposed to the exploitation of every square foot for the support of a teeming humanity, which marks the oldest and most advanced states. Each stage puts its own valuation upon the land according to the return from it which each expects to get. The low valuation is expressed in the border wilderness, by which a third or even a half of the whole area is wasted; and also in the readiness with which savages will often sell their best territory for a song.

For the same reason they leave their boundaries undefined; a mile nearer or farther, what does it matter? Moreover, their fitful or nomadic occupation of the land leads to oscillations of the frontiers with every attack from without and every variation of the tribal strength within. Their unstable states rarely last long enough in a given form or size to develop fixed boundaries; hence, the vagueness as to the extent of tribal domains among all savage peoples, and the conflicting land claims which are the abiding source of

* Norway, Official Publication for the Paris Exhibition, pp. 5, 83-84. Christiania, 1900.

† Albert J. Pickett, *History of Alabama*, pp. 416, 417, 461, 467. 1857. Reprint, Birmingham, 1900.

war. Owing to these overlapping boundaries—border districts claimed but not occupied—the American colonists met with difficulties in their purchase of land from the Indians, often paying twice for the same strip.

Even civilized peoples may adopt a waste boundary where the motive for protection is peculiarly strong, as in the half-mile neutral zone of lowland which ties the rock of Gibraltar to Spain. On a sparsely populated frontier, where the abundance of land reduces its value, they may throw the boundary into the form of a common district, as in the vast, disputed Oregon country, accepted provisionally as a district of joint occupancy between the United States and Canada from 1818 to 1846, or that wide highland border which Norway so long shared with Russia and Sweden. But such are only temporary phases in the evolution of a political frontier from wide, neutral border to the mathematically determined boundary line required by modern civilized states.

(Conclusion in the BULLETIN for August.)

GEOGRAPHIC INFLUENCE ON THE ECONOMIC HISTORY OF VIRGINIA.

BY

G. T. SURFACE.

The desire of gain, ambition for personal notoriety, and relief from religious or political oppression are the three important stimuli which have led to the discovery and occupancy of new territory. Each of these figured in the discovery and colonization of America. The commercial prompting predominated, since the great end to be achieved was the discovery of a shorter route to the South Sea, which would make the Indian trade more accessible. Whatever causes may have led to founding the Spanish settlements of the South, and later the Puritan settlements of New England, it is evident that the prospect of financial reward was the chief incentive which led to the settlement of that part of the American continent known as Virginia.

The expedition of Sir Humphrey Gilbert having proved a failure, Sir Walter Raleigh—his half brother—secured the patent renewed to himself, March 26th, 1584, and sailed April 27th from the west

American Geographical Society

Geographical Boundaries. II

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No. 8

GEOGRAPHICAL BOUNDARIES—II.

BY

ELLEN CHURCHILL SEMPLE.

(Part I in BULLETIN for July.)

When the political boundary has evolved by a system of contraction out of the wide waste zone to the nicely determined line, that line, nevertheless, is always encased, as it were, in a zone of contact wherein are mingled the elements of either side. This zone includes the peripheries of the two contiguous racial or national bodies, and in it each is modified and assimilated to the other. On its edges it is strongly marked by the characteristics of the adjacent sides, but its medial band shows a mingling of the two in ever-varying proportions; it changes from day to day and shifts backward and forward, according as one side or the other exercises in it more potent economic, religious, racial, or political influences.

Its peripheral character comes out strongly in the mingling of contiguous ethnic elements found in every frontier district. Here is that zone of transitional form which we have seen prevails so widely in nature. The northern border-land of the United States is in no small degree Canadian, and the southern is strongly Mexican. In the Rio Grande counties of Texas, Mexicans constituted in 1890 from 27 to 55 per cent. of the total population, and they were distributed in considerable numbers also in the second tier of counties. A broad band of French and English Canadians overlaps the northern hem of United States territory from Maine to North Dakota.* In the New York and New England counties bordering on the old French province of Quebec, they constitute from 11 to 22 per cent. of the total population, except in two or three western counties of Maine which have evidently been mere passways for a tide of

* Eleventh Census of the United States, Population, Part 1., map No. 10 and p. CXLIII.

habitants moving on to more attractive conditions of life in the counties just to the south.* But even these large figures do not adequately represent the British American element within our boundaries, because they leave out of account the native-born of Canadian parents who have been crossing our borders for over a generation.

If we turn to northern Italy, where a mountain barrier might have been expected to segregate the long-headed Mediterranean stock from the broad-headed Alpine stock, we find as a matter of fact that the ethnic type throughout the Po basin is markedly brachycephalic and becomes more pronounced along the northern boundary in the Alps, till it culminates in Piedmont, along the frontier of France, where it becomes identical with the broad-headed Savoyards.† More than this, Provençal French is spoken in the Dora Baltea valley of Piedmont; and along the upper Dora Riparia and in the neighbouring valleys of the Chisone and Pellice are the villages of the refugee Waldenses, who speak an idiom allied to the Provençal. More than this, the whole Piedmontese Italian is characterized by its approach to the French, and the idiom of Turin sounds very much like Provençal.‡ To the north there is a similar exchange between Italy and Switzerland with the adjacent Austrian province of the Tyrol. In the rugged highlands of the Swiss Grisons bordering upon Italy, we find a pure Alpine stock, known to the ancients as the Rhaetians, speaking a degenerate Latin tongue called Romansch, which still persists also under the names of Ladino and Frioul in the Alpine regions of the Tyrol and Italy. In fact, the map of the linguistic boundaries in the Grisons shows the dovetailing of German, Italian, and Romansch in a broad zone.§ The traveller in the southern Tyrol becomes accustomed in the natives to the combination of Italian colouring, German speech, and Alpine head form; whereas, if on reaching Italy he visits the hills back of Vicenza, he finds the German settlements of Tredici and Sette Comuni, where German customs, folklore, language, and German types of faces still persist, survivals from the days of German infiltration across the Brenner Pass.||

Where Slavs and Teutons come together in Central Europe, their race border is a zone lying approximately between 14 and 24 degrees East Longitude; it is crossed by alternate peninsulas of predominant

* Ibid. Based on comparison of Tables 15 and 33 for the States mentioned.

† W. Z. Ripley, *Races of Europe*, pp. 250-253. New York, 1899.

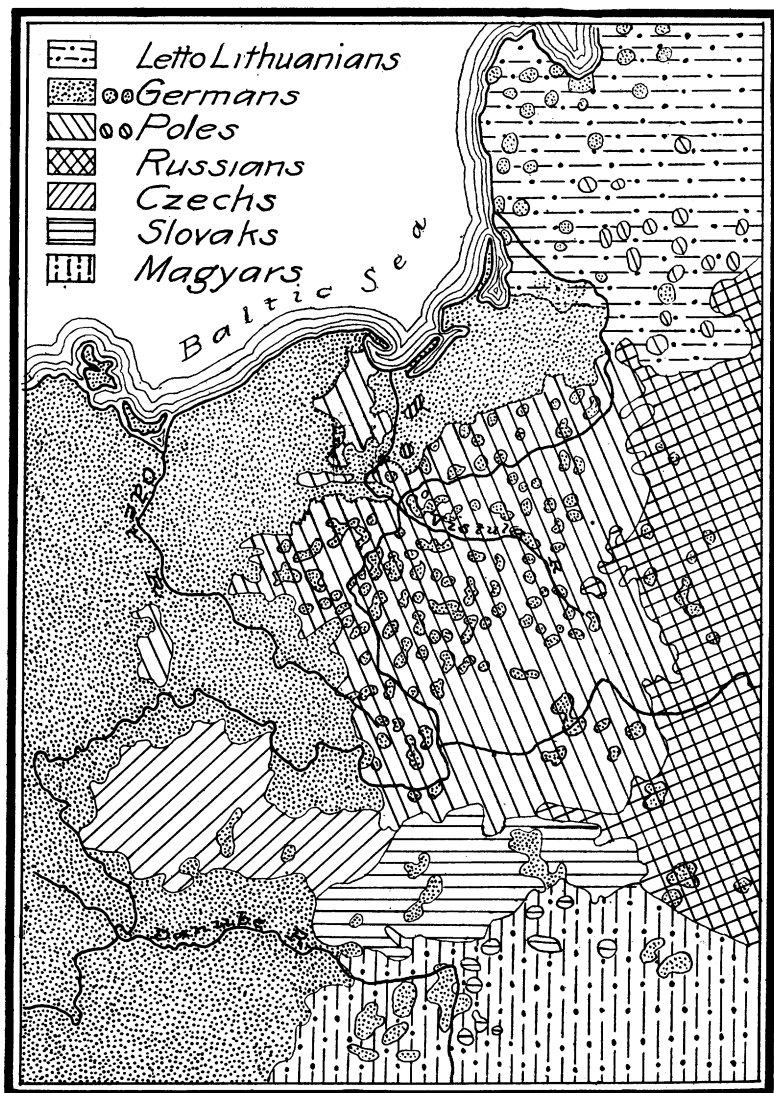
‡ W. Deecke, *Italy*, pp. 325, 347, 349. Translated from the German. London, 1904.

§ Sydow-Wagner, *Methodischer Schul-Atlas Völker und Sprachenkarten*, No. 13. Gotha, 1905.

W. Z. Ripley, *Races of Europe*, pp. 282-284. New York, 1899.

|| Ibid. pp. 255-257. W. Deecke, *Italy*, p. 357. London, 1904.

Germans and Austrians from the one side, Czechs and Poles from the other, the whole spattered over by a sprinkling of the two elements. Rarely, and then only for short stretches, do political and



ethnic boundaries coincide. The northern frontier hem of East Prussia lying between the River Niemen and the political line of demarcation is quite as much Lithuanian as German, while German stock dots the whole surface of the Baltic provinces of Russia as

far as St. Petersburg. The eastern rim of the Kaiser's empire as far south as the Karpethians presents a broad band of the Polish race, averaging about fifty kilometers (30 miles) in width, sparsely sprinkled with German settlements; these are found farther east also as an ethnic archipelago dotting the wide Slav area of Poland. The enclosed basin of Bohemia, protected on three sides by mountain walls and readily accessible to the Slav stock at the sources of the Vistula, enabled the Czechs to penetrate far westward and there maintain themselves; but in spite of encompassing mountains, the inner or Bohemian slopes of the Boehmer Wald, Erz, and Sudetes ranges constitute a broad girdle of almost solid German population.* In the Austrian provinces of Moravia and Silesia, which form the southeastward continuation of this Slav-German boundary zone, 60 per cent. of the population are Czechs, 33 per cent. are German, and 7 per cent., found in the eastern part of Silesia, are Poles.†

An ethnic map of the western Muscovite Empire in Europe shows a marked infiltration into White and Little Russia of West Slavs from Poland, and in the province of Bessarabia alternate areas of Russians and Roumanians. The latter in places form an unbroken ethnic expansion from the home kingdom west of the Pruth, extending in solid bands as far as the Dniester, and throwing out ethnic islands between this stream and the Bug. Southern Bessarabia is peopled largely by Bulgarians who have spread across the Danube delta from the steppes of the Dobruja, formerly Bulgarian but since 1881 Roumanian territory.

In the northern provinces of Russia, in the broad zone shared by the aboriginal Finns and the later-coming Slavs, Wallace found villages in every stage of Russification. "In one everything seemed thoroughly Finnish; the inhabitants had a reddish-olive skin, very high cheek bones, obliquely set eyes, and a peculiar costume; none of the women and very few of the men could understand Russian and any Russian who visited the place was regarded as a foreigner. In the second, there were already some Russian inhabitants; the others had lost something of their purely Finnish type, many of the men had discarded the old costume and spoke Russian fluently, and a Russian visitor was no longer shunned. In a third, the Finnish type was still further weakened; all the men spoke Russian, and nearly all the women understood it; the old male costume had entirely disappeared and the old female was rapidly following it; and intermarriage with the Russian population was no longer rare.

* Sydow-Wagner, *Methodischer Schul-Atlas Völker und Sprachenkarten*, No. 13. Gotha, 1905.

† Hugh R. Mill, *International Geography*, p. 309. New York, 1902.

In a fourth, intermarriage had almost completely done its work, and the old Finnish element could be detected merely in certain peculiarities of physiognomy and accent." This amalgamation extends to their religions—prayers wholly pagan devoutly uttered under the shadow of a strange cross, next the Finnish god Yumak sharing honours equally with the Virgin, finally a Christianity pure in doctrine and outward forms except for the survival of old pagan ceremonies in connection with the dead."*

At the confluence of the Volga and Kama rivers, this boundary zone of Russians and Finns meets the borderland of the Asiatic Mongols; and here is found an intermingling of races, languages, religions, and customs scarcely to be equalled elsewhere. Finns are infused with Tartar as well as Russian blood, and Russians show Tartar as well as Finnish traits. The Bashkirs, who constitute an ethnic peninsula running from the solid Mongolian mass of Asia, show every type of the mongrel.†

If we turn to Asia and examine the western race boundary of the expanding Chinese, we find that a wide belt of mingled ethnic elements, hybrid languages, and antagonistic civilizations marks the transition from Chinese to Mongolian and Tibetan areas. The eastern and southern frontiers of Mongolia, formerly marked by the Great Wall, are now difficult to define, owing to the steady encroachment of the agricultural Chinese on the fertile edges of the plateau, where they have converted the best-watered pastures of the Mongols into millet fields and vegetable gardens, leaving for the nomad's herds the more sterile patches between.‡ Every line of least resistance—climatic, industrial, commercial—sees the Chinese widening this transitional zone. He sprinkles his crops over the "Land of Grass," invades the trade of the caravan towns, sets up his fishing station on the great northern bend of the Hoang-ho in the Ordos country, three hundred miles beyond the Wall, to exploit the fishing neglected by the Mongols.§ The well-watered region of the Nan-Shan ranges has enabled him to drive a long, narrow ethnic peninsula, represented by the westward projection of Kansu Province between Mongolia and Tibet, into the heart of the Central Plateau. Here the nomad Si Fan tribes dwell side by side with Chinese farmers,|| who themselves show a strong infusion of the Mongolian and

* D. M. Wallace, *Russia*, pp. 151-155. New York, 1904.

† W. Z. Ripley, *Races of Europe*, p. 362. New York, 1899.

‡ Archibald Little, *The Far East*, Map p. 8 and pp. 171-172. Oxford, 1905.

§ M. Huc, *Travels in Tartary, Thibet and China, 1844-1846*. Vol. I, pp. 2-4, 21, 197-201, 284. Reprint, Chicago, 1898.

|| Ibid. Vol. I, pp. 166-170.

¶ Ibid. Vol. II, p. 23.

Tibetan blood to the north and south, and whose language is a medley of all three tongues.*

In easternmost Tibet, in the elevated province of Minjak (2,600 meters or 8,500 feet), M. Huc found in 1846 a great number of Chinese from the neighbouring Sze-Chuan and Yunnan districts keeping shops and following the primary trades and agriculture. The language of the Tibetan natives showed the effect of foreign intercourse; it was not the pure speech of Lhasa, but was closely assimilated to the idiom of the neighbouring Si Fan speech of Sze-Chuan and contained many Chinese expressions. He found also a modification of manners, customs, and costumes in this peripheral Tibet; the natives showed more of the polish, cunning, and covetousness of the Chinese, less of the rudeness, frankness, and strong religious feeling characteristic of the western plateau man.† Just across the political boundary in Chinese territory, the border zone of assimilation shows predominance of the Chinese element with a strong Tibetan admixture both in race and civilization.‡ Here Tibetan traders with their yak caravans are met on the roads or encamped in their tents by the hundred about the peripheral towns, whither they have brought the wool, sheep, horses, hides and medicinal roots of the rough highland across that "wild borderland which is neither Chinese nor Tibetan." The Chinese population consists of hardy mountaineers, who eat millet and maize instead of rice. The prevailing architecture is Tibetan and the priests on the highways are the red and yellow lamas from the Buddhist monasteries of the plateau. "The Country is a cross between China and Tibet."§

Even the high wall of the Himalayas does not suffice to prevent similar exchanges of ethnic elements and culture between southern Tibet and northern India. Lhasa and Giamda harbour many emigrants from the neighbouring Himalayan state of Bhutan, allow them to monopolize the metal industry, in which they excel, and to practise undisturbed their Indian form of Buddhism.|| The southern side of this zone of transition is occupied by a Tibetan stock of people inhabiting the Himalayan frontiers of India and practising the Hindu religion.¶ In the hill country of northern Bengal natives are to be seen with the Chinese queue hanging below a Hindu turban, or

* Ibid. Vol. I, pp. 312-313.

† Ibid. Vol. II, pp. 319-322, 327.

‡ M. Huc, *Journey through the Chinese Empire*, Vol. I, p. 36, New York, 1871.

§ Isabella Bird Bishop, *The Yangtze Valley, and Beyond*, Vol. II, pp. 70-71, 88, 91, 92, 104-109, 113, 117, 133, 134, 155, 194, 195. London, 1900.

|| M. Huc, *Travels in Tartary, Thibet and China*, 1844-1846, Vol. II, pp. 155-156, 264. Reprint, Chicago, 1898.

¶ Statistical Atlas of India, pp. 61-62. Maps. Calcutta, 1895.

wearing the Hindu caste mark on their broad Mongolian faces. With these are mingled genuine Tibetans who have come across the border to work in the tea plantations of this region.*

The assimilation of culture within a boundary zone is in some respects the result of race amalgamation, as, for instance, in costume, religion, manners and language; but in economic points it is often the result of identical geographic influences to which both races are alike subjected. For example, scarcity of food on the arid plateau of Central Asia makes the Chinese of western Kansu eat butter and curds as freely as do the pastoral Mongols, though such a diet is obnoxious to the purely agricultural Chinese of the lowlands.† The English pioneer in the trans-Allegheny wilderness shared with the Indians an environment of trackless forests and savage neighbours; he was forced to discard for a time many essentials of civilization, both material and moral. Despite a minimum of race intermixture, the men of the Cumberland and Kentucky settlements became assimilated to the life of the red man; they borrowed his scalping knife and tomahawk, adopted his method of ambush and extermination in war; like him they lived in great part by the chase, dressed in furs and buckskin, and wore the noiseless moccasin. Here the mere fact of geographical location on a remote frontier, and of almost complete isolation from the centres of English life on the Atlantic slope, and the further fact of persistent contact with a lower status of civilization, resulted in a temporary return to primitive methods of existence, till the settlements secured an increase of population adequate for higher industrial development and for defence.

A race boundary involves almost inevitably a cultural boundary, often, too, a linguistic and religious, occasionally a political boundary. The last three are subject to wide fluctuation, frequently overstepping all barriers of race and contrasted civilizations. Though one often accompanies another, it is necessary to distinguish the different kinds of boundaries and to estimate their relative importance in the history of a people or state. We may lay down the rule that the greater, more permanent, and deep-seated the contrasts on the two sides of a border, the greater is its significance; and that, on this basis, boundaries rank in importance, with few exceptions, in the following order: racial, cultural, linguistic, and political. The less marked the contrasts, in general, the more rapid and complete the process of assimilation in the belt of borderland.

* Eliza R. Scidmore, *Winter India*, pp. 106-108. New York, 1903.

† M. Huc, *Travels in Tartary, Thibet and China, 1844-1846*, Vol. I, pp. 312-313. Reprint, Chicago, 1898.

The significance of the border zone of assimilation for political expansion lies in the fact that it prepares the way for the advance of the state boundary from either side; in it the sharp edge of race and cultural antagonism is removed, or for this antagonism a new affinity may be substituted. The zone of American settlement, industry, and commerce which in 1836 projected beyond the political boundary of the Sabine River over the eastern part of Mexican Texas facilitated the later incorporation of the State into the Union, just as a few years earlier the Baton Rouge District of Spanish West Florida had gravitated to the United States by reason of the predominant American element there, and thus extended the boundary of Louisiana to the Pearl River. When the political boundary of Siberia was fixed at the Amoor River, the Muscovite Government began extending the border zone of assimilation far to the south of that stream by the systematic Russification of Manchuria with a view to its ultimate annexation. Schleswig-Holstein and Alsace-Lorraine, by reason of their large German population, have been readily incorporated into the German Empire. Only in Lorraine has a considerable French element retarded the process. The considerable sprinkling of Germans over the Baltic provinces of Russia and Poland west of the Vistula, and a certain Teutonic stamp of civilization which these districts have received, would greatly facilitate the eastward extension of the German Empire; while their common religions, both Protestant and Roman Catholic, would help obliterate the old political fissure. Thus the borderland of a country, so markedly differentiated from its interior, performs a certain historical function, and becomes, as it were, an organ of the living, growing race or state.

Location on a frontier involves remoteness from the centre of national, cultural, and political activities; these reach their greatest intensity in the core of the nation and exercise only an attenuated influence on the far-away borders, unless excellent means of communication keep up a circulation of men, commodities, and ideas between centre and periphery. For the frontier, therefore, the centripetal force is weakened; the centrifugal is strengthened often by the attraction of some neighbouring state or tribe, which has established bonds of marriage, trade, and friendly intercourse with the outlying community. Moreover, the mere infusion of foreign blood, customs, and ideas, especially a foreign religion, which is characteristic of a border zone, invades the national solidarity. Hence we find that a tendency to political defection constantly manifests itself along the periphery. A long reach weakens the arm of

authority, especially where serious geographical barriers intervene; hence border uprisings are usually successful, at least for a time. When accomplished, they involve that shrinkage of the frontiers which we have found to be the unmistakable symptom of national decline.

This defection shows itself most promptly in conquered border tribes of different blood who lack the bond of ethnic affinity, and whose remoteness emboldens them to throw off the political yoke. The decay of the Roman Empire, after its last display of energy under Trajan, was registered in the revolt of its peripheral districts beyond the Euphrates, Danube, and Rhine, as also in the rapid Teutonization of eastern Gaul, which here prepared the way for the assertion of independence. The border satraps of the ancient Persian Empire were constantly revolting, as the history of Asia Minor shows. Aragon, Old Castile, and Portugal were the first kingdoms in the Iberian Peninsula to throw off Saracen dominion. Mountain ranges and weary stretches of desert roads enabled the rebellions in Chinese Turkestan and the border districts of Dzungaria in 1863 to be maintained for several years.*

A feeble grasp upon remote peripheral possessions is often further weakened by the resistance of an immigrant population from beyond the boundary, which brings with it new ideas of government. This was the geographical history of the Texan revolt. A location on the far northern outskirts of Mexican territory, some twelve hundred miles from the capital, rendered impossible intelligent government control, the enforcement of the laws, and prompt defence against the Indians. Remoteness weakened the political cohesion. More than this, the American ethnic boundary lapped far over eastern Texas, forming that border zone of two-fold race which we have come to know. This alien stock, antagonistic to the national ideals emanating from the City of Mexico, dominant over the native population by reason of its intelligence, energy, and wealth, ruptured the feeble political bond and asserted the independence of Texas. Quite similar was the history of the "Independent State of Acre," which in 1899 grew up just within the Bolivian frontier under the leadership of Brazilian caoutchouc gatherers, resisted the collection of taxes by the Bolivian Government, and four years later secured annexation to Brazil.†

Even when no alien elements are present to weaken the race bond, if natural barriers intervene to obstruct and retard communi-

* Alexis Krausse, *Russia in Asia*, pp. 174-175. New York, 1899.

† Charles E. Akers, *History of South America*, 1854-1904, p. 562. New York, 1904.

cation between centre and periphery, the frontier community is likely to develop the spirit of defection, especially if its local geographic, and hence social, conditions are markedly different from those of the governing centre. This is the explanation of that demand for independent statehood which was rife in our trans-Allegheny settlements from 1785 to 1795, and of that separatist movement which advocated political alliance with either the British colonies to the north or the Spanish to the west, because these were nearer and offered easier access to the sea. A frontier location and an intervening mountain barrier were important factors in the Whisky Rebellion in western Pennsylvania, just as similar conditions later suggested the secession of the Pacific States from the Union. Disaffection with the Government was manifested by the Trek Boers of early South Africa, "especially by those who dwelt in the outlying districts where the Government had exerted and could exert little control." In 1795 the people of Graaf-Reinet, a frontier settlement of that time, revolted against the Dutch South African Company and set up a miniature republic.*

When to a border situation is added a geographic location affording conditions of long-established isolation, this tendency to maintain political autonomy becomes very pronounced. This is the explanation of so many frontier mountain states that have retained complete or partial independence, such as Nepal, Bhutan, the Asturias, which successfully withstood Saracen attack, and Montenegro, which has repelled alike Venetian, Servian, and Turkish dominion. Europe especially has numerous examples of these unabsorbed border states, whose independence represents the equilibrium of the conflicting political attractions about them. But all these smallest fragments of political territory have either some commercial or semi-political union with one or another of their neighbours. The little independent principality of Liechtenstein, wedged in between Switzerland and the Tyrol, is included in the customs union of Austro-Hungary; so the small, independent monarchy of Luxemburg, which has been attached in turn to all the great states which have grown up along its borders, is included in the *Zollverein* of Germany. The republic of Andorra, far up in a lofty valley of the Pyrenees, which has maintained its freedom for a thousand years, acknowledges certain rights of suzerainty exercised by France and the Spanish bishopric of Urgel.† A link between the two

* Bryce, *Impressions of South Africa*, pp. 108-109. New York, 1897.

† H. R. Mill, *International Geography*, p. 378. New York, 1902.

neighbouring states and yet independent of them, it is politically a typical product of a border environment.

Oftentimes a state gains by recognizing this freedom-loving spirit of the frontier, and by turning it to account for national defence along an exposed boundary. In consequence of the long wars between Scotland and England, to the Scotch barons having estates near the Border were given the Wardenships of the Marches, offices of great power and dignity; and their clans, accustomed only to the imperfect military organization demanded by the irregular but persistent hostilities of the time and place, developed a lawless spirit. Prohibited from agriculture by their exposed location, they left their fields waste, and lived by pillage and cattle-lifting from their English and even their Scotch neighbours. The valour of these southern clans, these "reivers of the Border," was the bulwark of Scotland against the English, but their mutinous spirit resisted the authority of the king and led them often to erect semi-independent principalities.*

China has fringed her western boundaries with quasi-independent tribes whose autonomy is assured and whose love of freedom is a guarantee of guerilla warfare against any invader from Central Asia. The Mantze tribes in the mountain borders of Sze-Chuan province have their own rulers and customs, and only pay tribute to China.† The highlands of Kansu are sprinkled with such independent tribes. Sometimes a definite bargain is entered into—a self-governing military organization and a yearly sum of money in return for defence of the frontier. The Mongol tribes of the Charkar country or "Borderland" just outside the Great Wall northwest of Peking constitute a paid army of the Emperor to guard the frontier against the Khalkhas of northern Mongolia, the tribe of the Genghis Khan.‡ Similarly, semi-independent military communities for centuries made a continuous line of barriers against the raids of the steppe nomads along the southern and southeastern frontiers of Russia from the Dnieper to the Ural Rivers. These were the "Free Cossacks," located on the debatable ground between the fortified frontier of the agricultural steppe and marauding Crimean Tartars. Nominally subjects of the Czar, they obeyed him when it suited them, and on provocation rose in open revolt. The Cossacks of the Dnieper, who to the middle of the seventeenth century formed Poland's border de-

* Wm. Robertson, *History of Scotland*, pp. 19-20. New York, 1831. *The Scotch Borderers*, Littell's Living Age, Vol. 40, p. 180.

† Isabella Bird Bishop, *The Yangtze Valley and Beyond*, Vol. II., pp. 209-210. London, 1900.

‡ M. Huc, *Travels in Tartary, Thibet and China*, 1844-1846, Vol. I, pp. 41, 42, 97. Reprint. Chicago, 1898.

fence against Tartar invasion, were jealous of any interference with their freedom. They lent their services on occasions to the Sultan of Turkey, and even to the Crimean Khan; and finally, in 1681, attached themselves and their territory to Russia.* Here speaks that spirit of defection which is the natural product of the remoteness and independence of frontier life. The Russians also attached to themselves the Kalmucks located between the lower Volga and Don, and used them as a frontier defence against their Tartar and Kirghiz neighbours. In this case, as in that of the Cossacks and the Charkars of eastern Mongolia, we have a large body of men living in the same arid grassland, leading the same pastoral life, and carrying on the same kind of warfare as the nomadic marauders whose pillaging, cattle-lifting raids they aim to suppress. The imperial orders to the Charkars limit them strictly to the life of herdmen, with the purpose of maintaining their mobility and military efficiency. So in olden times, for the Don Cossacks agriculture was prohibited on pain of death, lest they should lose their taste for the live-stock booty of a punitive raid. A still earlier instance of this utilization of border nomads is found in the first century after Christ, when the Romans made the Arabian tribe of Beni Jafre, dwelling on the frontier of Syria, the warders of the eastern marches of the Empire.

The advancing frontier of an expanding people often carries them into a sparsely settled country where the unruly members of society can with advantage be utilized as colonists. After centralized and civilized Russia began to encroach with the plough upon the pastures of the steppe Cossacks, and finally suppressed these military republics, the more turbulent and obstinate remnants of them she colonized along the Kuban and Terek rivers, to serve as bulwarks against the incursions of the Caucasus tribes and as the vanguard of the advance southward.†

This is one principle underlying the transportation of criminals to the frontier. They serve to hold the new country. The Russian advance into Siberia has, since 1709, set up its milestones in settlements formed of prisoners of war, political exiles, and worse offenders.‡ Penal colonists located on the shores of Kamtchatka helped build and man the crazy boats which set out for Alaska at the end of the eighteenth century. China settles its thieves and cheats among the villages of its own border provinces of Shensi§ and Kansu;

* D. M. Wallace. *Russia*, pp. 352-356. New York, 1904. Article on Cossacks in the *Encyclopædia Britannica*.

† D. M. Wallace, *Russia*, p. 358. New York, 1904. Walter K. Kelly, *History of Russia*, Vol. II, pp. 394-395. London, 1881.

‡ Alexis Krausse, *Russia in Asia*, pp. 43, 53. New York, 1899.

§ Francis H. Nichols, *Through Hidden Shensi*, pp. 139-140. New York, 1902.

but its worst criminals it transports far away to the Ili country on the western frontier of the Empire, where they have doubtless contributed to the spirit of revolt that has there manifested itself.*

The abundance of opportunity and lack of competition in a new frontier community, its remoteness from the centre of authority, and its imperfect civil government serve to attract thither the shiftless and vicious, as well as the sturdy and enterprising. The society of the early Trans-Allegheny frontier included both elements. The lawless who drifted to the border formed gangs of horse thieves, highwaymen, and murderers, who called forth from the others the summary methods of lynch law.† North Carolina, which in its early history formed the southern frontier of Virginia, swarmed with ruffians who had fled thither to escape imprisonment or hanging, and whose general attitude was to resist all regular authority and especially to pay no taxes.‡ Similarly, that wide belt of mountain forest which forms the waste boundary between Korea and Manchuria is the resort of bandits who have harried both sides of the border ever since this neutral district was established in the thirteenth century.§ The frontier communities of the Russian Cossacks in the seventeenth and eighteenth centuries were regular asylums for runaway serfs and peasants who were fleeing from taxation; their hetmans were repeatedly fugitive criminals. The eastern border of Russia formed by the Volga basin in 1775 was described as “an asylum for malcontents and vagabonds of all kinds, ruined nobles, disrobed monks, military deserters, fugitive serfs, highwaymen, and Volga pirates”—disorderly elements which contributed greatly to the insurrection led by the Ural Cossacks in that years.|| “The Debatable Land,” a tract between the Esk and Sark rivers, formerly claimed by both England and Scotland, was long the haunt of thieves, outlaws and vagabonds, as indeed was the whole Border, subject as it was to the regular jurisdiction of neither side.¶

Just beyond the political boundary, where police authority comes to an end and where pursuit is cut short or retarded, the fleeing criminal finds his natural asylum. Hence all border districts tend to harbour undesirable refugees from the other side. Deserters and outlaws from China proper sprinkle the eastern districts of Mon-

* M. Huc, *Travels in Tartary, Thibet and China*, 1844-1846, Vol. 1, p. 23. Reprint, Chicago, 1898.

† Theodore Roosevelt, *The Winning of the West*, Vol. 1, pp. 130-132. New York, 1895.

‡ John Fiske, *Old Virginia and Her Neighbors*, Vol. II, pp. 311, 315-321. Boston, 1897.

§ Archibald Little, *The Far East*, p. 249. Oxford, 1905.

|| Alfred Rambaud, *History of Russia*, Vol. II, pp. 45, 199-200. Boston, 1886.

¶ Malcolm Lang, *History of Scotland*, Vol. 1, pp. 42-43. London, 1800. *The Scotch Borderland*, *Gentleman's Magazine*, Vol. CCLX, p. 191, Feb., 1886.

golia.* Marauding bands of Apaches and Sioux, after successful depredations on American ranches, for years fled across the line into Mexico and Canada before the hammering hoof-beats of Texas Ranger and United States cavalry, until a treaty with Mexico in 1882, authorizing such armed pursuit to cross the boundary, cut off at least one asylum.† Our country exchanges other undesirable citizens with its northern and southern neighbours in cases where no extradition treaty provides for their return; and the borders of the individual states are crossed and recrossed by shifty gentlemen seeking to dodge the arm of the law. The fact that so many State boundaries fall in the southern Appalachians, where illicit distilling and feud murders provide most of the cases on the docket, has materially retarded the suppression of these crimes by increasing the difficulty both of apprehending the offender and of subpoenaing the reluctant witness.

Dissatisfied, oppressed, or persecuted members of a political community are prone to seek an asylum across the nearest border, where happier or freer conditions of life are promised. There they contribute to that mixture of race which characterizes every boundary zone, though as an embittered people they may also help to emphasize any existing political or religious antagonism. The Revocation of the Edict of Nantes in 1685 was followed by an exodus of Huguenots from France to the Protestant states of Switzerland, the Palatinate of the Rhine, and Holland, as also across the Channel into southern England; just as in recent years the Slav borderland of eastern Germany has received a large immigration of Polish Jews from Russia. When the Polish king in 1571 executed the leader of the Dnieper Cossacks, thousands of these bold borderers left their country and joined the community of the Don; and in 1722 after the Dnieper community had been crushed by Peter the Great, a similar exodus took place across the southern boundary into the Crimea, whereby the Tartar horde was strengthened, just as a few years before, during an unsuccessful revolt of the Don Cossacks, some two thousand of the malcontents crossed the southern frontier to the Kuban River in Circassia.‡ The establishment of America independence in 1783 saw an exodus of loyalists from the United States into the contiguous districts of Ontario, New Brunswick, and Spanish Florida; five years later discontent with the Federal Government for its dilatory opposition to the occlusion of the Mississippi

* Friedrich Ratzel, *History of Mankind*, Vol. III, p. 175. London, 1896.

† A. B. Hart, *Foundations of American Foreign Policy*, pp. 81-82. New York, 1901.

‡ Alfred Rambaud, *History of Russia*, Vol. II, pp. 45, 50. Boston, 1886.

and the lure of commercial betterment sent many citizens of the early Trans-Allegheny commonwealths to the Spanish side of the Mississippi,* while the Natchez District on the east bank of the river contained a sprinkling of French who had become dissatisfied with Spanish rule in Louisiana and changed their domicile.

These are some of the movements of individuals and groups which contribute to the blending of races along every frontier, and make of the boundary a variable zone as opposed to the rigid artificial line, in terms of which we speak.

* Justin Winsor, *The Westward Movement*, p. 366. Boston, 1899.

VIRGINIA TRADE AND COMMERCE.

BY

G. T. SURFACE.

Excepting the complicated factor of human traffic, the commercial relations in Virginia under slavery were surprisingly simple, as compared with the social ideals and customs of the time. The explanation for this is manifest, in that the large labour surplus enabled the owners to be producers of most of the articles consumed, and at the same time produce a large surplus of tobacco, the most profitable commodity in the export trade. In 1790, Virginia ranked first in the total value of exports (\$3,131,865). By 1830 the export trade had increased to \$4,791,644; while for the same year the imports only aggregated \$405,739, showing how adequately the demands were met by the home manufacturers.

The passing of the War crisis, with its destruction to life and property, and the emancipation of slaves, made necessary a new system of production, which in turn brought about a reactionary adjustment of Virginia's commercial relations. The decade following the Civil War is the period which marks the beginning of a new era in the industrial and commercial development of the State. We shall, therefore, discuss briefly the factors which gave impetus and foundation to the succeeding order. The immediate and most urgent demand was to become self-sustaining, by the production of food-stuffs and clothing, since all of the surplus had been consumed during the four-years' struggle, which centred on Virginia territory, and from which the people of the State suffered most. Co-ordinate with this was the demand for restoring the property losses incurred.



Coast Peoples

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about their margins. Their water, being poor in food-salts and rich in humic acids, has a restricted aquatic flora; but the same conditions may obtain in the lowlands, when the flora of the lakes will be similar. On the other hand, a highland loch having a supply of food-salts, with a suitable shore and sheltered from prevailing winds, may quite well have the character of a lowland loch regarding its flora.*

COAST PEOPLES.

By ELLEN CHURCHILL SEMPLE.

PART I.

OF all geographical boundaries, the most important is that between land and sea. The coast, in its physical nature, is a zone of transition between these two dominant forms of the Earth's surface; it bears the mark of their contending forces, varying in its width with every stronger onslaught of the unresting sea, and with every degree of passive resistance made by granite or sandy shore. So too in an anthropogeographical sense, it is a zone of transition. Now the life-supporting forces of the land are weak in it, and it becomes merely the rim of the sea; for its inhabitants the sea means food, clothes, shelter, fuel, commerce, highway, and opportunity. Now the coast is dominated by the exuberant forces of a productive soil, so that the ocean beyond is only a turbulent waste and a long-drawn barrier: the coast is the hem of the land. Neither influence can wholly exclude the other in this amphibian belt, for the coast remains the intermediary between the habitable expanse of the land and the international highway of the sea. The break of the waves and the dash of the spray draw the line beyond which human dwellings cannot spread; for these the shore is the outermost limit, as for ages also in the long infancy of the races, before the invention of boat and sail, it drew the absolute boundary to human expansion. In historical order, its first effect has been that of a barrier, and for the majority of peoples this it has remained; but with the development of navigation and the spread of human activities from the land over sea to other countries, it became the gateway both of land and sea—at once the outlet for exploration, colonization, and trade, and the open door through which a continent or island receives contributions of men or races or ideas from transoceanic shores. Barrier and threshold: these are the rôles which coasts have always played in history. To-day we see them side by side. But in spite of the immense proportions assumed by transmarine intercourse, the fact remains that the greater part of the coasts of the Earth are for their inhabitants only a barrier

* For further information on the lochs and their plants, see "A Comparative Study of the Dominant Phanerogamic and Higher Cryptogamic Flora of Aquatic Habit, in Three Lake Areas of Scotland" (with 110 illustrations), by George West, *Proc. Roy. Soc. Edin.*, vol. 25, pp. 967-1023 (1905).

and not an outlet, or at best only a base for timorous ventures seaward that rarely lose sight of the shore.

As intermediary belt between land and sea, the coast becomes a peculiar habitat which leaves its mark upon its people. We speak of coast strips, coastal plains, "tidewater country," coast cities; of coast tribes, coast peoples, maritime colonies; and each word brings up a picture of a land or race or settlement permeated by the influences of the sea. The old term of "coast-line" has no application to such an intermediary belt, for it is a zone of measurable width, and this width varies with the relief of the land, the articulation of the coast according as it is uniform or complex, with the successive stages of civilization and the development of navigation among the people who inhabit it.

Along highly articulated coasts, showing the interpenetration of sea and land in a broad band of capes and islands separated by tidal channels and inlets, or on shores deeply incised by river estuaries, or on low shelving beaches which screen brackish lagoons and salt marshes behind sand reefs and dune ramparts, and which thus form an indeterminate boundary of alternate land and water, the zone character of the coast in a physical sense becomes conspicuous. In an anthropological sense the zone character is clearly indicated by the different uses of its inner and outer edge made by man in different localities and in different periods of history.

The old German maritime cities of the North sea and the Baltic were located on rivers from 6 to 60 miles from the open sea, always on the inner edge of the coastal belt. Though primarily trading towns, linked together once in the sovereign confederacy of the Hanseatic League, they fixed their sites on the last spurs of firm ground running out into the soft, yielding alluvium, which was constantly exposed to inundation. Land high enough to be above the ever threatening flood of river and storm-driven tide on this flat coast, and solid enough to be built upon, could not be found immediately on the sea. The slight elevations of sandy "geest" or plateau spurs were limited in area and in time outgrown. Hence the older parts of all these river towns, from Bremen to Königsberg, rest upon hills, while in every case the newer and lower part is built on piles or artificially raised ground on the alluvium.* So Utrecht, the *Ultrajectum* of the Romans, selected for its site a long raised spur running out from the solid ground of north-western Germany into the water-soaked alluvium of the Netherlands. It was the most important town of all this region before the arts of civilization began the conquest by dyke and ditch of the amphibian coastal belt which now comprises one-fourth of the area and one-half

* Rudolph Reinhard, 'Die Wichtigsten Deutschen Seehandelstädte,' pp. 24, 25. Stuttgart: 1901. For Hamburg, see Joseph Partsch, 'Central Europe,' p. 291. London: 1903.

the population of the Netherlands.* So ancient London marked the solid ground at the inner edge of the tidal flats and desolate marshes which lined the Thames estuary, as the Roman Camulodoum and its successor Colchester on its steep rise or *dun* overlooked the marshes of the Stour inlet.† Farther north about the Wash, which in Roman days extended far inland over a wide area of fens and tidal channels, Cambridge on the river Cam, Huntingdon and Stamford on the Nen, and Lincoln on the Witham—all river seaports—defined the firm inner edge of this wide low coast. In the same way the landward rim of the tidal waters and salt marshes of the Humber inlet was described by a semicircle of British and Roman towns—Doncaster, Castleford, Todcaster, and York.‡ On the flat or rolling West African coastland, which lines the long shores of the Gulf of Guinea with a band 30 to 100 miles wide, the sandy, swampy tracts immediately on the sea are often left uninhabited; native population is distributed most frequently at the limit of deep water, and here at head of ship-navigation the trading towns are found.§

While, on low coasts at any rate, the inner edge tends to mark the limit of settlements advancing from the interior, as the head of sea navigation on river and inlet it has also been the goal of immigrant settlers from oversea lands. The history of modern maritime colonization, especially in America, shows that the aim of regular colonists, as opposed to mere traders, has been to penetrate as far as possible into the land while retaining communication with the sea, and thereby with the mother country. The small boats in use till the introduction of steam navigation fixed this line far inland and gave the coastal zone a greater breadth than it has at present, and a more regular contour. In colonial America this inner edge coincided with the "fall-line" of the Atlantic rivers, which was indicated by a series of seaport towns, or by the inland limit of the tides, which on the St. Lawrence fell above Quebec, and on the Hudson just below Albany.

With the recent increase in the size of the vessels, two contrary effects are noticed. In the vast majority of cases, the inner edge, as marked by ports, moves seaward into deeper water, and the zone narrows. The days when almost every tobacco plantation in tidewater Virginia had its own wharf are long since past, and the leaf is now exported by way of Norfolk and Baltimore. Seville has lost practically all its sea trade to Cadiz, Rouen to Havre, and Dordrecht to Rotterdam. In other cases the zone preserves its original width by the creation of secondary ports on or near the outer edge, reserved only for the largest vessels, while the inner harbour, by dredging its channel, improves its

* Ibid., p. 301.

† John Richard Green, 'The Making of England,' vol. 1, pp. 51-54; maps, pp. 36 and 54. London: 1904.

‡ Ibid., vol. 1, pp. 12 and 63; maps, pp. xxii. and 54.

§ Friedrich Ratzel, 'History of Mankind,' vol. 3, pp. 97, 139. London: 1898.

communication with the sea. Thus arises the phenomenon of twin ports like Bremen and Bremerhaven, Dantzic and Neufahrwasser, Stettin and Swinemünde, Bordeaux and Pauillac, London and Tilbury. Or the original harbour seeks to preserve its advantage by canalizing the shallow approach by river, lagoon, or bay, as St. Petersburg by the Pantiloff canal through the shallow reaches of Kronstadt bay; or Königsberg by its ship canal, carried for 25 miles across the Frisches Haff to the Baltic; * or Nantes by the Loire ship canal, which in 1892 was built to regain for the old town the West Indian trade recently intercepted by the rising outer port of St. Nazaire, at the mouth of the Loire estuary.† In northern latitudes, however, the outer ports on semi-enclosed sea basins like the Baltic become important in the winter, when the inner ports are ice-bound. Otherwise the outer port sinks with every improvement in the channel between the inner port and the sea. Hamburg has so constantly deepened the Elbe passage that its outport of Cuxhaven has had little chance to rise, and serves only as an emergency harbour; while on the Weser, maritime leadership has oscillated between Bremen and Bremerhaven.‡ So the whole German coast and the Russian Baltic have seen a more or less irregular shifting backwards and forwards of maritime importance between the inner and the outer edges.

The width of the coast zone is not only prevented from contracting by dredging and canaling, but it is even increased. By deepening the channel, the chief port of the St. Lawrence river has been removed from Quebec 180 miles upstream to Montreal, and that of the Clyde from Port Glasgow 16 miles to Glasgow itself, so that now the largest ocean steamers come to dock where fifty years ago children waded across the stream at ebb tide. Such artificial modifications, however, are rare, for they are made only where peculiarly rich resources or superior lines of communication with the hinterland justify the expenditures; but they find their logical conclusion in still farther extensions of sea navigation into the interior by means of ship canals, where previously no water highway existed. Instances are found in the Manchester ship canal and the Welland, which, by means of the St. Lawrence and the Great Lakes, makes Chicago accessible to ocean vessels. Though man distinguishes between sea and inland navigation in his definitions, in his practice he is bound by no formula and recognizes no fundamental difference where rivers, lakes, and canals are deep enough to admit his sea-going craft.

Such deep landward protrusions of the head of marine navigation at certain favoured points, as opposed to its recent coastward trend in

* Joseph Partsch, 'Central Europe,' pp. 284-288. London: 1903.

† H. R. Mill, 'International Geography,' p. 251. New York: 1902.

‡ Rudolph Reinhard, 'Die Wichtigsten Deutschen Seehandelstädte,' pp. 21-22. Stuttgart: 1901.

most inlets and rivers, greatly increase the irregularity of the inner edge of the coast zone by the marked discrepancy between its maximum and minimum width. They are limited, however, to a few highly civilized countries, and to a few points in those countries. But their presence testifies to the fact that the evolution of the coast zone with the development of civilization shows the persistent importance of this inner edge.

The outer edge finds its greatest significance, which is for the most part ephemeral, in the earlier stages of navigation, maritime colonization, and in some cases of original settlement. But this importance persists only on steep coasts furnishing little or no level ground for cultivation and barred from interior hunting or grazing land; on many coral and volcanic islands of the Pacific ocean whose outer rim has the most fertile soil and furnishes the most abundant growth of coco palms, and whose limited area only half suffices to support the population; and in polar and sub-polar districts, where harsh climatic conditions set a low limit to economic development. In all these regions the sea must provide most of the food of the inhabitants, who can therefore never lose contact with its waters. In mountainous Tierra del Fuego, whose impenetrably forested slopes rise directly from the sea, with only here and there a scanty stretch of stony beach between them, the natives of the southern and western coasts keep close to the shore. The straits and channels yield them all their food, and are the highways for all their restless, hungry wanderings.* The steep slopes and dense forests preclude travel by land, and force the wretched inhabitants to live as much in their canoes as in their huts. The Thlingit and Haida Indians of the mountainous coast of southern Alaska locate their villages on some smooth sheltered beach, with their houses in a single row facing the water, and the ever-ready canoe drawn up on shore in front. They select their sites with a view to food supply, and to protection in case of attack. On the treeless shores of Kadiak island and of the long narrow Alaska peninsula near by, the Eskimo choose their village location for an accumulation of driftwood, for proximity to their food supply, and a landing-place for their kayaks and bidarkas. Hence they prefer a point of land or gravel spit extending out into the sea, or a sand reef separating a salt-water lagoon from the open sea. The Aleutian islanders regard only accessibility to the shell-fish on the beach and their pelagic hunting and fishing; and this consideration has influenced the Eskimo tribes of the wide Kuskokwin estuary to such an extent, that they place their huts only a few feet above ordinary high tide, where they are constantly exposed to overflow from the sea.† Only

* Fitz-Roy and Darwin, 'Voyage of the Beagle,' vol. 2, pp. 140, 178; vol. 3, pp. 231-236. London: 1839.

† Eleventh Census, 'Population and Resources of Alaska,' pp. 166-171. Washington: 1893.

among the great tidal channels of the Yukon delta are they distributed over the whole wide coastal zone, even to its inner edge.

The coast Chukches of north-eastern Siberia locate their tent villages on the sand ramparts between the Arctic ocean and the freshwater lagoons which line this low tundra shore. Here they are conveniently situated for fishing and hunting marine animals, while protected against the summer inundations of the Arctic rivers.* The whole western side of Greenland, from far northern Upernivik south to Cape Farewell, shows both Eskimo and Danish settlements almost without exception on projecting points of peninsulas or islands, where the stronger effect of the warm ocean current, as well as proximity to the food supply, serve to fix their habitations; although the remains of the old Norse settlements in general are found in sheltered valleys with summer vegetation, striking off from the fiords some 20 miles back from the outer coast.† Cæsar found that the ancient Veneti, an immigrant people of the southern coast of Brittany, built their towns on the points of capes and promontories, sites which gave them ready contact with the sea and protection from attack from the land side, because every rise of the tide submerged the intervening lowlands.‡ Here a sterile plateau hinterland drove them for part of their subsistence to the water, and the continuous intertribal warfare of small primitive states to the sea-girt asylums of the capes.

In the early history of navigation and exploration, striking features of this outer coast edge, like headlands and capes, became important sea marks. The promontory of Mount Athos, rising 6400 feet above the sea between the Hellespont and the Thessalian coast, and casting its shadow as far as the market-place of Lemnos, was a guiding point for mariners in the whole northern Ægean.§ For the ancient Greeks Cape Malea was long the boundary stone to the unknown wastes of the western Mediterranean, just as later the Pillars of Hercules marked the portals to the *mare tenebrosum* of the stormy Atlantic. So the Sacred Promontory (Cape St. Vincent) of the Iberian peninsula defined for Greeks and Romans the south-western limit of the habitable world.|| Centuries later the Portuguese marked their advance down the west coast of Africa, first by Cape Non, which so long said "No!" to the struggling mariner, then by Cape Bojador, and finally by Cape Verde.

In coastwise navigation, minor headlands and inshore islands were points to steer by; and in that early maritime colonization, which had

* Nordenskiöld, 'The Voyage of the Vega,' pp. 327, 334, 335, 365, 366, 412, 416, 459, 467. New York: 1882.

† G. Frederick Wright, 'Greenland Icefields,' pp. 68-70, 100, 105. New York: 1896.

‡ 'Bello Gallico,' book iii. ch. 12.

§ Ernst Curtius, 'History of Greece,' vol. 1, p. 15. New York.

|| Strabo's 'Geography,' book ii. ch. v. 4; book iii. ch. i. 4.

chiefly a commercial aim, they formed the favourite spots for trading stations. The Phœnicians in their home country fixed their settlements by preference on small capes, like Sidon and Berytus, or on inshore islets, like Tyre and Aradus,* and in their colonies and trading stations they chose similar sites, whether on the coast of Sicily,† Spain, or Morocco.‡ Carthage was located on a small hill-crowned cape projecting out into the Bay of Carthage, and the two promontories embracing this inlet were edged with settlements, especially the northern arm, which held Utica and Hippo,§ the latter on the site of the modern French naval station of Bizerta.

In this early Hellenic world, when Greek sea-power was in its infancy, owing to the fear of piracy, cities were placed a few miles back from the coast; but with the partial cessation of this evil, sites on shore and peninsula were preferred as being more accessible to commerce,|| and such of the older towns as were in comparatively easy reach of the seaboard established there each its own port. Thus we find the ancient urban pairs of Argos and Nauplia, Troezen and Pogon, Mycæne and Eionæ, Corinth commanding its Ægean port of Cenchreæ 8 miles away on the Saronic gulf, to catch the Asiatic trade, and connected by a walled thoroughfare 1½ mile long with Lechæum, a second harbour on the Corinthian gulf which served the Italian commerce.¶ In the same group belonged Athens and its Piræus, Megara and Pegæ, Pergamus and Elæ in western Asia Minor.** These ancient twin cities may be taken to mark the two borders of the coast zone. Like the modern ones which we have considered above, their historical development has shown an advance from the inner towards the outer edge, though owing to different causes. However, the retired location of the Baltic and North sea towns of Germany served as a partial protection against the pirates who, in the Middle Ages, scoured these coasts. Lubeck, originally located nearer the sea than at present, and frequently demolished by them, was finally rebuilt farther inland up the Trave river.†† Later the port of Travemünde grew up at the mouth of the little estuary.

The early history of maritime colonization shows in general two geographic phases: first, the appropriation of the islet and headland outskirts of the seaboard, and later—it may be much later—an advance towards the inner edge of the coast, or yet farther into the interior. Progress from the earlier to the maturer phase depends upon the social

* Grote, 'History of Greece,' vol. 3, 266–267. New York: 1857.

† Thucydides, book vi. 2.

‡ Grote, 'History of Greece,' vol. 3, p. 273. New York: 1857.

§ Strabo's 'Geography,' book xvii. ch. iii. 13, 14.

|| Thucydides, book i. 5, 7, 8.

¶ Strabo, book viii. ch. vi. 2, 4, 13, 14, 22.

** Grote, 'History of Greece,' vol. 3, pp. 4, 191. New York: 1857.

†† Rudolph Reinhard, 'Die Wichtigsten Deutschen Seehandelstädte,' p. 23. Stuttgart: 1901.

and economic development of the colonizers as reflected in their valuation of territorial area. The first phase, the outcome of a low estimate of the value of land, is best represented by the Phœnician and earliest Greek colonies, whose purposes were chiefly commercial, and who sought merely such readily accessible coastal points as furnished the best trading stations on the highway of the Mediterranean and the adjacent seas.* The earlier Greek colonies, like those of the Triopium promontory forming the south-western angle of Asia Minor, Chalcidice, the Thracian Chersonesus, Calchedon, Byzantium, the Pontic Heraclea, and Sinope, were situated on peninsulas or headlands, that would afford a convenient anchor ground; or, like Syracuse and Mitylene, on small inshore islets, which were soon outgrown, and from which the towns then spread to the mainland near by.† The advantages of such sites lay in their accessibility to commerce, and in their natural protection against the attack of strange or hostile mainland tribes. For a nation of merchants, satisfied with the large returns but also with the ephemeral power of middlemen, these considerations sufficed. While the Phœnician trading posts in Africa dotted the outer rim of the coast, the inner edge of the zone was indicated by Libyan or Ethiopian towns, where the inhabitants of the interior bartered their ivory and skins for the products of Tyre.‡ So that commercial expansion of the Arabs down the east coast of Africa in the tenth century seized upon the off-shore islands of Zanzibar, Pemba, and Mafia, the small inshore islets like Mombasa and Lamu, and the whole outer rim of the coast from the equator southward to the Rovuma river; nor had the sultan's territory expanded a decade ago, when he had to relinquish the long thread of his continental possessions.

But when a people has advanced to a higher conception of colonization as an outlet for national as well as commercial expansion, and when it sees that the permanent prosperity of both race and trade in the new locality depends upon the occupation of larger tracts of territory and the development of local resources as a basis for exchanges, their settlements spread from the outer rim of the coasts to its inner edge and yet beyond, if alluvial plains and river highways are present as lures into the interior. Such was the history of many later colonies of the Greeks and Carthaginians,§ and especially of most modern colonial movements, for these have been dominated by a higher estimate of the value of land.

After the long Atlantic journey, the outposts of the American coast were welcome resting-places to the early European voyagers, but, owing to their restricted area and therefore limited productivity, they were soon abandoned, or became mere bases for inland expansion. The little

* Grote, 'History of Greece,' vol. 3, p. 179. New York: 1857.

† Ibid., vol. 3, pp. 194 and 363.

‡ Ibid., vol. 3, p. 273.

§ Ibid., vol. 3, pp. 195, 197, 275.

island of Cuttyhunk, off southern Massachusetts, was the site of Gosnold's abortive attempt at colonization in 1602, like Raleigh's attempt on Roanoke island in 1585, and the later one of Popham on the eastern headland of Casco bay. The Pilgrims paused at the extremity of Cape Cod, and again on Clark's island, before fixing their settlement on Plymouth bay. Monhegan island, off the Maine coast, was the site of an early English trading post, which, however, lasted only from 1623 to 1626; * and the same dates fix the beginning and end of a fishing and trading station established on Cape Ann, and removed later to Salem harbour. The Swedes made their first settlement in America on Cape Henlopen, at the entrance of Delaware bay; but their next, only seven years later, they located well up the estuary of the Delaware river. Thus for the modern colonist the outer edge of the coast is merely the gateway of the land; from it he passes rapidly to the settlement of the interior, wherever fertile soil and abundant resources promise a due return upon his labour.

Since it is from the land, as the inhabited portion of the Earth's surface, that all maritime movements emanate, and to the land that all oversea migrations are directed, the reciprocal relations between land and sea are largely determined by the degree of accessibility existing between the two. This depends primarily upon the articulation of a land mass, whether it presents an unbroken contour like Africa and India, or whether, like Asia and Norway, it drops a fringe of peninsulas and a shower of islands into the bordering ocean. Mere distance from the sea bars a country from its vivifying contact; every protrusion of an ocean artery into the heart of a continent makes that heart feel the pulse of life on far-off unseen shores. The Baltic inlet which makes a seaport of St. Petersburg 800 miles (1300 kilometres) back from the western rim of Europe, brings Atlantic civilization to this half-Asiatic side of the continent. The solid front presented by the Iberian peninsula and Africa to the Atlantic has a narrow crack at Gibraltar, whence the Mediterranean penetrates inland 2300 miles (3700 kilometres), and converts the western foot of the Caucasus and the roots of the Lebanon mountains into a seaboard. By means of the Arabian sea, the Indian ocean runs northward 1300 miles (2200 kilometres) from Cape Comorin to meet the Indus delta; and then turns westward 700 miles farther through the Oman and Persian gulfs to receive the boats from the Tigris and Euphrates. Such marine inlets create islands and peninsulas, which are characterized by proximity to the sea on all or many sides, and in the interior of the continents produce every degree of nearness shading off into inaccessible remoteness from the watery highway of the deep.

The success with which such indentations open up the interior of the continents depends upon the length of the inlets and the size of the

* W. B. Weedon, 'Economic and Social History of New England,' vol. 1, p. 93. Boston: 1899.

land mass in question. Africa's huge area and unbroken contour combine to hold the sea at arm's length; Europe's deep-running inlets open that small continent so effectively that Kazan, Russia's most eastern city of considerable size, is only 750 miles (1200 kilometres) distant from the nearest White sea, Baltic, and Azof ports. Asia, the largest of all the continents, despite a succession of big indentations that invade its periphery from Sinai peninsula to East Cape, has a vast inland area hopelessly far from the surrounding oceans.

In order to determine the coast articulation of any country or continent, Carl Ritter and his followers divided area by shoreline, the latter a purely mathematical line representing the total contour length. By this method Europe's ratio is 1 linear mile of coast to 174 square miles of area, Australia's 1:224, Asia's 1:490, and Africa's 1:700. This means that Europe's proportion of coast is three times that of Asia and four times that of Africa; that a country like Norway, with a shoreline of 12,000 miles traced in and out along the fiords and around the larger islands,* has only 10 square miles of area for every mile of seaboard, while Germany, with every detail of its littoral included in the measurement, has only 1515 miles of shoreline and a ratio of 1 mile of coast to every 159 square miles of area.

The criticism has been made against this method that it compares two unlike measures, square and linear, which moreover increase or decrease in markedly different degrees, according as larger or smaller units are used. But for the purposes of anthropogeography the method is valid, inasmuch as it shows the amount of area dependent for its marine outline upon each mile of littoral. A coast, like every other boundary, performs the important function of intermediary in the intercourse of a land with its neighbours; hence the length of this sea boundary materially affects this function. Surface and periphery are not dead mathematical quantities, but organs of one body which stand in close reciprocal activity, and which can be understood only in the light of their persistent mutual relations. The division of the area of a land by the length of its coastline yields a quotient which to the anthropogeographer is not a dry figure, but an index to the possible relations between seaboard and interior. A comparison of some of these ratios will illustrate this fact.

Germany's shoreline, traced in contour without including details, measures 787 miles; this is just one-fifth that of Italy and two-fifths that of France, so that it is short. But since Germany's area is nearly twice Italy's and a little larger than that of France, it has 267 square miles of territory for every mile of coast, while Italy has only 28 square miles, and France 106. Germany has towns that are 434 miles from the nearest seaboard, but in Italy the most inland point is only 148 miles

* Norway, Official Publication for the Paris Exhibition, p. 1. Christiania, 1900.
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from the Mediterranean.* If we turn now to the United States and adopt Mendenhall's estimate of its general or contour coastline as 5705 miles, we find that our country has 530 square miles of area dependent for its outlet upon each mile of seaboard. This means that our coast has a heavy task imposed upon it, and that its commercial and political importance is correspondingly enhanced; that the extension of our Gulf of Mexico littoral by the purchase of Florida and the annexation of Texas was a measure of self-preservation, and that the unbroken contour and mountain-walled face of our Pacific littoral is a serious national handicap.

But this method is open to the legitimate and fundamental criticism that, starting from the conception of a coast as a mere line instead of a zone, it ignores all those features which belong to every littoral as a strip of the Earth's surface—location, geologic structure, relief, slope, accessibility to the sea in front and to the land behind, all which vary from one part of the world's seaboard to another, and serve to differentiate the human history of every littoral. Moreover, of all parts of the Earth's surface, the coast as the hem of the sea and land, combining the characters of each, is most complex. It is the coast as a human habitat that primarily concerns anthropogeography; and a careful analysis of the multifarious influences modifying one another in this mingled environment of land and water reveals an intricate interplay of geographic forces, varying from inland basin to marginal sea, from marginal sea to open ocean, and changing from one historical period to another—an interplay so mercurial that it could find only a most inadequate expression in a rigid mathematical formula.

As the coast, then, is the border zone between the solid, inhabited land and the mobile, untenanted deep, two important factors in its history are the accessibility of its back country on the one hand, and the accessibility of the sea on the other. A littoral barred from its hinterland by mountain range or steep plateau escarpment or desert tract feels little influence from the land; level or fertile soil is too limited in amount to draw inland the growing people, intercourse is too difficult and infrequent, transportation too slow and costly. Hence the inhabitants of such a coast are forced to look seaward for their racial and commercial expansion, even if a paucity of good harbours limits the accessibility of the sea, and to lead a somewhat detached and independent existence, so far as the territory behind them is concerned. Here the coast, as a peripheral organ of the interior, as the outlet for its products, the market for its foreign exchanges, and the medium for intercourse with its maritime neighbours, sees its special function impaired. But it takes advantage of its isolation and the protection of a long sea boundary to detach itself politically from its hinterland, as

* *Frederich Ratzel, 'Deutschland,' pp. 150, 151. Leipzig: 1898.*

the history of Phœnicia, the *Ægean* coast of Asia Minor, Dalmatia, the republics of Amalfi, Venice, and Genoa, the county of Barcelona, and Portugal abundantly prove; and at the same time it profits by its sea-board location to utilize the more varied fields of maritime enterprise before it, in lieu of the more or less forbidden territory behind it. The height and width of the landward barrier, the number and practicability of the passways across it, and especially the value of the hinterland's products in relation to their bulk, determine the amount of intercourse between that hinterland and its mountain or desert barred littoral.

The interior is most effectively cut off from the periphery, where a mountain range or a plateau escarpment traces the inner line of the coastland, as in the province of Liguria in northern Italy, Dalmatia, the western side of the Indian peninsula, most parts of Africa, and long stretches of the Pacific littoral of the Americas. The highland that backs the Norwegian coast is crossed by only one railroad, that passing through the Trondhjem depression; and this barrier has served to keep Norway's historical connection with Sweden far less intimate than with Denmark. The long inlet of the Adriatic, bringing the sea well into the heart of Southern Europe, has seen nevertheless a relatively small maritime development, owing to the wall of mountains that everywhere shuts out the hinterland of its coasts. The greatness of Venice was intimately connected with the Brenner pass over the Alps on the one hand, and the trade of the eastern Mediterranean on the other. Despite Austro-Hungary's crucial interest in the north-east corner of the Adriatic as a maritime outlet for this vast inland empire, and its herculean efforts at Trieste and Fiume to create harbours and to connect them by transmontane railroads with the valley of the Danube, the maritime development of this coast is still restricted, and much of Austria's trade goes out northward by German ports.* Farther south along the Dalmatian and Albanian coasts, the deep and sheltered bays between the half-submerged roots of the Dinaric Alps have developed only local importance, because they lack practicable connection with the interior. This was their history too in early Greek and Roman days, for they found only scant support in the few caravans that crossed by the Roman road to Dyrrachium to exchange the merchandise of the *Ægean* for the products of the Ionian isles. Spain has always suffered from the fact that her bare, arid, and unproductive tableland almost everywhere rises steeply from her fertile and densely populated coasts; and therefore that the two have been unable to co-operate either for the production of a large maritime commerce or for natural political unity. Here the diverse conditions of the littoral and the wall of the great central terrace of the country have emphasized that tendency to defection that belongs

* Joseph Partsch, 'Central Europe,' pp. 227-230. London: 1903

to every periphery, and therefore necessitated a strong centralized government to consolidate the restive maritime provinces with their diverse Galician, Basque, Catalanian, and Andalusian stocks into one nation with the Castilians of the plateau.*

Where mountain systems run out endwise into the sea, the longitudinal valleys with their drainage streams open natural highways from the interior to the coast. This structure has made the Atlantic side of the Iberian peninsula far more open than its Mediterranean front, and therefore given that western face the lead in maritime affairs since 1450. So from the shores of Thrace to the southern point of the Peloponnesus, all the valleys of Greece open out on the eastern or Asiatic side; here every mountain-flanked bay has had its own small hinterland to draw upon, and every such interior has been accessible to the civilization of the Ægean; here was concentrated the maritime and cultural life of Hellas.† The northern half of Andean Colombia, by way of the parallel Atrato, Rio Cauco, and Magdalena valleys, has supported the activities of its Caribbean littoral, and through their avenues has received such foreign influences as might penetrate to inland Bogota. In like manner, the mountain-ridged peninsula of Farther India keeps its interior in touch with its leading ports through its intermontane valleys of the Irawadi, Salwin, Menam, and Mekong rivers.

Low coasts rising by easy gradients to wide plains, like those of northern France, Germany, southern Russia, and the Gulf seaboard of the United States, profit by an accessible and extensive hinterland. Occasionally, however, this advantage is curtailed by a political boundary reinforced by a high protective tariff, as Holland, Belgium, and East Prussia know to their sorrow.

These low hems of the land, however, often meet physical obstructions to ready communication with the interior in the silted inlets, shallow lagoons, marshes, or mangrove swamps of the littoral itself. Here the larger drainage streams give access through this amphibian belt to the solid land behind. Where they flow into a tide-swept bay like the North sea or the English channel, they scour out their beds and preserve the connection between sea and land; but debouchment into a tideless basin like the Caspian or the Gulf of Mexico, even for such mighty streams as the Volga and the Mississippi, sees the slow silting up of their mouths and the restriction of their agency in opening up the hinterland. Thus the character of the bordering sea may help to determine the accessibility of the coast from the land side.

Its accessibility from the sea depends primarily upon its degree of articulation; and this articulation depends upon whether the littoral

* Elisée Reclus, 'The Earth and its Inhabitants: Europe,' vol. 1, pp. 370-372. New York: 1882.

† Ernst Curtius, 'History of Greece,' vol. 1, pp. 15-20. New York.

belt has suffered elevation or subsidence. When the inshore sea rests upon an uplifted bottom, the contour of the coast is smooth and unbroken, because most of the irregularities of surface have been overlaid by a thick deposit of waste from the land; so it offers no harbour except here and there a silted river mouth, while it shelves off through a broad amphibian belt of tidal marsh, lagoon, and sand reef to a shallow sea. Such is the coast of New Jersey, most of the Gulf seaboard of the United States and Mexico, the Coromandel coast of India, and the long, low littoral of Upper Guinea. Such coasts harbour a population of fishermen living along the strands of their placid lagoons,* and stimulate a timid inshore navigation which sometimes develops to extensive coastwise intercourse, where a network of lagoons and deltaic channels forms a long inshore passage, as in Upper Guinea, but which fears the break of the surf outside.†

The rivers draining these low uplifted lands are deflected from their straight path to the sea by coastwise deposits, and idly trail along for miles just inside the outer beach; or they are split up into numerous offshoots among the silt beds of a delta, to find their way by shallow, tortuous channels to the ocean, so that they abate their value as highways between sea and land. The silted mouths of the Nile excluded the larger vessels even of Augustus Cæsar's time and admitted only their lighters,‡ just as to-day the lower Rufigi river loses much of its value to German East Africa because of its scant hospitality to vessels coming from the sea.

The effect of subsidence, even on a low coastal plain, is to increase accessibility from the sea by flooding the previous river valleys and transforming them into a succession of long shallow inlets, alternating with low or hilly tongues of land. Such embayed coasts form our Atlantic seaboard from Delaware bay, through Chesapeake bay to Pamlico sound, the North sea side of England, the funnel-shaped "förden" or firths on the eastern side of Jutland and Schleswig-Holstein, and the ragged sounds or "Bodden" that indent the Baltic shore of Germany from the Bay of Lubeck to the mouth of the Oder river.§ Although the shallowness of the bordering sea and the sand-bars and sand reefs which characterize all flat coasts here also exclude the largest vessels, such coasts have nevertheless ample contact with both land and sea. They tend to develop, therefore, the activities appropriate to both. A fertile soil and abundant local resources, as in tidewater Maryland and Virginia, makes the land more attractive than

* William Morris Davis, 'Physical Geography,' pp. 115-122. 1899.

† Frederick Ratzel, 'History of Mankind,' vol. 3, p. 95. London: 1898.

‡ Strabo, book xvii. ch. i. 18. Diodorus Siculus, book i. ch. iii. p. 36. Translated by G. Booth. London: 1814.

§ J. Partsch, 'Central Europe,' pp. 96-98. London: 1903. F. Ratzel, 'Deutschland,' pp. 143-144. Leipzig: 1898.

the sea; the inhabitants become farmers rather than sailors. On the other hand, an embayed coastland promising little return to the labour of tillage, but with abundant fisheries and a superior location for maritime trade, is sure to profit by the accessible sea, and achieve the predominant maritime activity which characterized the mediæval Hanse Towns of northern Germany and our colonial New England.

Subsidence that brings the beat of the surf against the bolder reliefs of the land produces a ragged, indented coast, deep-water inlets penetrating far into the country, hilly or mountainous tongues of land running far out into the sea and breaking up into a swarm of islands and rocks, whose outer limits indicate approximately the old prediluvial line of shore.* Such are the fiord regions of Norway, southern Alaska, British Columbia, Greenland, and southern Chili; the Rias or submerged river valley coast of north-western Spain; and the deeply sunken mountain flank of Dalmatia, whose every lateral valley has now become a bay or a strait between mainland and island. All these coasts are characterized by a close succession of inlets, a limited amount of level country for settlement or cultivation, and in their rear a steep slope impeding communication with their hinterland. Inaccessibility from the land, a high degree of accessibility from the sea, and a paucity of local resources unite to thrust the inhabitants of such coasts out upon the deep, to make of them fishermen, seamen, and ocean carriers. The same result follows where no barrier on the land side exists, but where a granitic or glaciated soil in the interior discourages agriculture and landward expansion, as in Brittany, Maine, and Newfoundland. In all these the land repels and the sea attracts. Brittany furnishes one-fifth of all the sailors in France's merchant marine,† and its pelagic fishermen sweep the seas from Newfoundland to Iceland. Three-fifths of the maritime activity of the whole Austrian Empire is confined to the ragged coast of Dalmatia, which furnishes to-day most of the sailors for the imperial marine, just as in Roman days she manned the Adriatic fleet of the Cæsars.‡ The Haida, Tsimshian, and Thlingit Indians of the ragged western coast of British Columbia and southern Alaska spread their villages on the narrow tide-swept hem of the land, and subsist chiefly by the generosity of the deep. They are poor landsmen, but excellent boat-makers and seamen, venturing sometimes 25 miles out to sea to gather birds' eggs from the outermost fringe of rocks.

As areas of elevation or subsidence are, as a rule, extensive, it follows that coasts usually present long stretches of smooth simple shoreline, or a long succession of alternating inlet and headland. Therefore different littoral belts show marked contrasts in their degree of accessibility to

* For geomorphology of coasts, see William Morris Davis, 'Physical Geography,' pp. 112-136, 347-383. Boston: 1899.

† Elisée Reclus, 'The Earth and its Inhabitants: Europe,' vol. 2, p. 252.

‡ J. Partsch, 'Central Europe,' p. 231. London: 1903.

the sea, and their harbours appear in extensive groups of one type—fiord, river estuaries, sand or coral reef lagoons, and embayed mountain roots. A sudden change in relief or in geologic history sees one of these types immediately succeeded by a long-drawn group of a different type. Such a contrast is found between the Baltic and North sea ports of Denmark and Germany, the eastern and southern seaboard of England, the eastern and western sides of Scotland, and the Pacific littoral of North America north and south of Juan de Fuca strait.

A common morphological history, marked by mountain uplift, glaciation, and subsidence, has given an historical development similar in not a few respects to the fiord coasts of New England, Norway, Iceland, Greenland, the Alaskan "panhandle," and southern Chile. So large subsidence areas on the Mediterranean coasts from the Strait of Gibraltar to the Bosphorus have in essential features duplicated each other's histories, just as the low infertile shores of the Baltic from Finland to the Skager Rack have had much in common in their past development.

Where, however, a purely local subsidence, as in Kamerun bay and Old Calabar on the elsewhere low monotonous stretch of the Upper Guinea coast,* or a single great river estuary, as in the La Plata and the Columbia, affords a protected anchorage on an otherwise portless shore, such inlets assume increased importance. In the long unbroken reach of our Pacific seaboard, San Francisco bay and the Columbia estuary are of inestimable value; while, by the treaty of 1848 with Mexico, the international boundary line was made to bend slightly south of west from the mouth of the Gila river to the coast, in order to include in the United States territory the excellent harbour of San Diego. The mere nicks in the rim of South-West Africa constituting Walfish bay and Angra Pequena assume considerable value as trading stations and places of refuge along that 1200-mile reach of inhospitable coast extending from Cape Town north to Great Fish bay.† It is worthy of notice in passing that, though both of these small inlets lie within the territory of German South-West Africa, Walfish bay with 20 miles of coast on either side is a British possession, and that two tiny islets which command the entrance to the harbour of Angra Pequena, also belong to Great Britain. On the uniform coast of East Africa, the single considerable indentation formed by Delagoa bay assumes immense importance, which, however, is due in part to the mineral wealth of its Transvaal hinterland; but from this point northward for 35° of latitude, a river mouth, like that fixing the site of Beira, or an inshore islet affording protected harbourage, like that of Mombasa, serves as the single ocean gateway of a vast territory, and forms the terminus of a railroad—proof of its importance.

* G. G. Chisholm, 'Commercial Geography,' pp. 444, 446. London: 1904.

† H. R. Mill, 'International Geography,' p. 1012. New York: 1902. Hereford George, 'Historical Geography of the British Empire,' pp. 278-279. London: 1904.

The maritime evolution of all amply embayed coasts, except in Arctic and sub-Arctic regions inimical to all historical development, shows in its highest stage the gradual elimination of minor ports, and the concentration of maritime activity in a few favoured ones, which have the deepest and most capacious harbours and the best river, canal, or railroad connection with the interior. The earlier stages are marked by a multiplicity of ports, showing in general activity nearly similar in amount and in kind. England's merchant marine in the fourteenth century was distributed in a large group of small but important ports on the southern coast, all which, owing to their favourable location, were engaged in the French and Flemish trade; and in another group on the east coast, reaching from Hull to Colchester, which participated in the Flemish, Norwegian, and Baltic trade.* Most of these have now declined before the overpowering competition of a few such seaboard marts as London, Hull, and Southampton; the introduction of steam trawlers into the fishing fleets has in like manner led to the concentration of the fishermen in a few large ports with good railroad facilities, such as Aberdeen and Grimsby, while the fishing villages that fringed the whole eastern and southern coasts have been gradually depopulated.† So in colonial days, when New England was little more than a cordon of settlements along that rock-bound littoral, almost every inlet had its port actively engaged in coastwise and foreign commerce in the West Indies and the Guinea Coast, in cod and mackerel fisheries, in whaling and shipbuilding, and this with only slight local variations.‡ This widespread homogeneity of maritime activity has been succeeded by strict localization and differentiation, and reduction from many to few ports. So, for the whole Atlantic seaboard of the United States, evolution of seaports has been marked by increase of size attended by decrease of numbers.

A well dissected coast, giving ample contact with the sea, often fails nevertheless to achieve historical importance, unless outlying islands are present to ease the transition from inshore to pelagic navigation, and to tempt to wider maritime enterprise. The long sweep of the European coast from northern Norway to Brittany has played out a significant part of its history in that procession of islands formed by Iceland, the Færoes, Shetland, Orkneys, Great Britain, and the Channel isles, whether it was the navigator of ancient Armorica steering his leather-sailed boat to the shores of Cæsar's Britain, or the modern Breton fisherman pulling in his nets off the coasts of distant Iceland. The dim outline of mountainous Cyprus, seen against a far-away horizon from the slopes of

* J. E. Thorold Rogers, 'Six Centuries of Work and Wages,' pp. 123-124. New York: 1884.

† H. R. Mill, 'International Geography,' p. 148. New York: 1902.

‡ Ellen C. Semple, 'American History and its Geographic Conditions,' pp. 121-128. Boston: 1903.

Lebanon, beckoned the Phœnician ship-master thither to trade and to colonize, just as the early Etruscan merchants passed from their busy ironworks on the island of Elba over the narrow strait to visible Corsica.* It was on the eastern side of Greece, with its deep embayments, its valleys opening out to the Ægean, with its 483 islands scattered thickly as stars in the sky, and its Milky Way of the Cyclades leading to the deep, rich soils of the Asia Minor coast, with its sea-made contact with all the stimulating influences and dangers emanating from the Asiatic littoral, that Hellenic history played its impressive drama. Here was developed the spirit of enterprise that carried colonies to far western Sicily and Italy,† while the western or rear side had a confined succession of local events, scarce worthy the name of history. Neither mountain-walled Epirus nor Corcyra had a Hellenic settlement in 735 B.C., at a date when the eastern Greeks had reached the Ionian coast of the Ægean and had set up a lonely group of colonies even on the Bay of Naples. Turning to America, we find that the Antilles received their population from the only two tribes, first the Aruacs and later the Caribs, who ever reached the indented northern coast of South America between the Isthmus of Panama and the mouth of the Orinoco. Here the small islands of the Venezuelan coast, often in sight, lured these peoples of river and shore to open-sea navigation, and drew them first to the Windward isles, then northward step by step or island by island, to Hayti and Cuba.‡

In all these instances, offshore islands tempt to expansion and thereby add to the historical importance of the near-by coast. Frequently, however, they achieve the same result by offering advantageous footholds to enterprising voyagers from remote lands, and become the medium for infusing life into hitherto dead coasts. The long monotonous littoral of East Africa from Cape Guadafui to the Cape of Good Hope, before the planting here of Portuguese way-stations on the road to India in the sixteenth century, was destitute of historical significance, except that stretch opposite the islands of Zanzibar and Pemba, which Arab merchants in the tenth century appropriated as the basis for their slave and ivory trade. So the long gentle curve of the East Indies have been so many off-shore stations whence, first through the Portuguese, and later through the Dutch, European influences percolated into South-Eastern Asia. Asia, with its island-strewn shores, has diffused its influences over a broad zone of the western Pacific, and through the agency of its active restless Malays, even halfway across that ocean. In contrast, the western coast of the Americas, a stretch nearly 10,000 miles from Tierra

* Diodorus Siculus, book v. ch. i. p. 304. Translated by G. Booth. London: 1814. Strabo, book v. ch. vi. 6, 7.

† Grote, 'History of Greece,' vol. 3, pp. 357, 360-366. New York: 1857.

‡ Hans Helmolt, 'History of the World,' vol. 1, pp. 188-189, 193-195. New York: 1902.

del Fuego to the Aleutian chain, has seen its aboriginal inhabitants barred from seaward expansion by the lack of offshore islands, and its entrance upon the historical stage delayed till recent times.

In general it can be said that islandless seas attain a later historical development than those whose expanse is rendered less forbidding by hospitable fragments of land. This factor, as well as its location remote from the old and stimulating civilization of Syria and Asia Minor, operated to retard the development of the western Mediterranean long after the eastern basin had reached its zenith; but in this eastern basin, again, the paucity of islands and unbroken contour of its southern half gave a meagre history to all its shores lying south of Cyprus, Crete, and Malta.

(*To be continued.*)

REVIEWS.

ASIA.

A JOURNEY IN NORTH-EASTERN TIBET.

'Das Rätzel des Matschu. Meine Tibet Expedition.' Von Wilhelm Filchner. *Maps and Illustrations*. Berlin: Mittler. 1907.

'Das Kloster Kumbum in Tibet.' By the same. *Maps and Illustrations*. Berlin: Mittler. 1906.

'Wissenschaftliche Ergebnisse der Expedition Filchner nach China und Tibet, 1903-05.' X. Band, I. Teil. Berlin: Mittler. 1908.

THE journey of which these works are the outcome was in many ways a remarkable one. It was undertaken, not for mere purposes of sport or adventure, but with a fixed determination on the part of the author to achieve a piece of work which it might take all his manhood to accomplish. Having set himself a definite task, he spared no pains to qualify himself for its execution, and allowed no difficulties to deter him from carrying it through when begun. The chosen field was, as he claims, at the time of his setting out, the most important unknown area in the whole of interior Asia—that traversed by the upper course of the Hwang-ho, and stretching southward from this towards the mountainous border of northern Szechuan; and, although unable to carry out every part of his programme, he was successful in stretching a line of survey across the very centre of this little-trod region.

Lieut. Filchner had the advantage of two zealous coadjutors in his work. His wife—who accompanied him to the threshold of Tibet, and during his further journey spent an anxious time of waiting in the family of Mr. Ridley, an English missionary at Sining-fu—gave substantial help in the formation of the botanical, zoological, and ethnological collections, besides keeping up a regular series of meteorological observations during her residence at Sining. His other companion, Dr. Tafel, whose own recent journey has been frequently referred to in these pages, undertook the geological researches, and was able to bring together a large collection of rock-specimens. The leader himself was fully occupied with the route survey, astronomical determination of positions, altitude determinations, meteorological observations made three times daily, magnetic observations at forty-two stations, and photographic work, besides botanical and zoological collections. The working up of all this material has been a task of considerable magnitude, but being attached (through the influence of the late Baron von Richthofen, a constant supporter of the



Coast Peoples (Continued)

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COAST PEOPLES.*

By ELLEN CHURCHILL SEMPLE.

PART II.

Among coast-dwelling peoples we find every degree of intimacy with the water, from the amphibian life of many Malay tribes who love the wash of the waves beneath their pile-built villages, to the Nama bushmen who inhabit the dune-walled coast of South-West Africa, and know nothing of the sea. In the resulting nautical development the natural talents and habits of the people are of immense influence; but these in turn have been in part determined by the geographical environment of their previous habitat, whether inland or coastal, and by the duration in time, as well as the degree and necessity, of their contact with the sea. The Phœnicians, who, according to their traditions as variously interpreted, came to the coast of Lebanon either from the Persian gulf or the Red sea,† brought to their favourable maritime location a different endowment from that of the land-trading Philistines who moved up from the south to occupy the sand-choked shores of Palestine,‡ or from that of the Jews, bred to the grasslands of Mesopotamia and the grainfields of Egypt, who only at rare periods in their history forced their way to the sea.§ The unindented coast stretching from Cape Carmel south to the Nile delta never produced a maritime people and never achieved maritime importance, till a race of experienced mariners like the Greeks planted their colonies and built their harbour moles on the shores of Sharon and Philistia.|| So on the west face of Africa, from the Senegal southward along the whole Guinea Coast to Benguela, all evidences of kinship and tradition among the local tribes point to an origin on the interior plains and a recent migration seaward,¶ so that no previous schooling enabled them to exploit the numerous good harbours along this littoral, as did the sea-bred Portuguese and English.

Not only the accessibility of the coast from the sea, but also its habitability enters as a factor into its historical importance. A sandy desert coast, like that of South-West Africa and much of the Peruvian littoral, or a sterile mountain face, like that of Lower California, excludes the people of the country from the sea. Saldanha bay, the

* Continued from p. 90.

† Strabo, book xvi. ch. iii. 4, 27; Herodotus, book i. ch. i., book vii. ch. 89.

‡ George Adam Smith, 'Historical Geography of the Holy Land,' pp. 169-170. New York: 1897.

§ Ibid., pp. 179, 185, 286.

|| Ibid., pp. 127-131.

¶ F. Ratzel, 'History of Mankind,' vol. 3, pp. 100-102; and *passim*, 132-145. London: 1898.

one good natural harbour on the west coast of Cape Colony, is worthless even to the enterprising English, because it has no supply of fresh water.* The failure of the ancient Egyptians to take the short step forward from river to marine navigation can undoubtedly be traced to the fact that the sour swamps, barren sand-dunes, and pestilential marshes on the seaward side of the Nile delta must have always been sparsely populated as they are to-day,† and that a broad stretch of sandy waste backed their Red sea littoral.

On the other hand, where the hem of the continents is fertile enough to support a dense population, a large number of people are brought into contact with the sea, even where no elaborate articulation lengthens the shoreline. When this teeming humanity of a garden littoral is barred from landward expansion by desert or mountain, or by the already overcrowded population of its own hinterland, it wells over the brim of its home country, no matter how large, and overflows to other lands across the seas. The congested population of the fertile and indented coast of southern China, though not strictly speaking a sea-faring people, found an outlet for their redundant humanity and their commerce in the tropical Sunda islands. By the sixth century their trading junks were doing an active business in the harbours of Java, Sumatra, and Malacca; they had even reached Ceylon and the Persian gulf, and a little later were visiting the great focal market of Aden at the entrance of the Red sea.‡ A strong infusion of Chinese blood improved the Malay stock in the Sunda islands, and later in North Borneo and certain of the Philippines, whither their traders and emigrants turned in the fourteenth century, when they found their opportunities curtailed in the archipelago to the south by the spread of Islam.§ Now the "yellow peril" threatens the whole circle of these islands from Luzon to Sumatra.

Similarly India, first from its eastern, later from its western coast, sent a stream of traders, Bhuddist priests, and colonists to the Sunda islands, and especially to Java, as early as the fifth century of our era, whence Indian civilization, religion, and elements of the Sanskrit tongue spread to Borneo, Sumatra, Bali, Lombok, and even to some smaller islands among the Molucca group.|| The Hindus became the dominant commercial nation of the Indian ocean long before the great development of Arabian sea power, and later shared the trade of the East African coast with the merchants of Oman and Yemen.¶ To-day they

* H. R. Mill, 'International Geography,' p. 985. New York: 1902.

† D. G. Hogarth, 'The Nearer East,' pp. 84, 166. London: 1902.

‡ Hans Helmolt, 'History of the World,' vol. 2, p. 544, 593. New York: 1904.

§ F. Ratzel, 'History of Mankind,' vol. 1, p. 397. London: 1896. 'Philippine Census,' vol. 1, pp. 438, 481-491. Washington: 1905.

|| H. Helmolt, 'History of the World,' vol. 2, p. 547. New York: 1904.

¶ Ibid., vol. 3, pp. 431, 434.

form a considerable mercantile class in the ports of Maskat, Aden, Zanzibar, Pemba, and Natal.

On the coasts of large fertile areas like China and India, however, maritime activity comes not as an early, but as an eventual development, assumes not a dominant, but an incidental historical importance. The coastlands appearing early on the maritime stage of history, and playing a brilliant part in the drama of the sea, have been habitable, but their tillable fields have been limited either in fertility, as in New England, or in amount, as in Greece, or in both respects, as in Norway. But if blessed with advantageous location for international trade and many or even a few fairly good harbours, such coasts tend to develop wide maritime dominion and colonial expansion.

Great fertility in a narrow coastal belt barred from the interior serves to concentrate and energize the maritime activities of the nation. The 20-mile wide plain stretching along the foot of the Lebanon range from Antioch to Cape Carmel is even now the garden of Syria.* In ancient Phœnician days its abundant crops and vines supported luxuriant cities and a teeming population, which sailed and traded and colonized to the Atlantic outskirts of Europe and Africa. Moreover, their maritime ventures had a wide sweep as early as 1100 B.C. Quite similar to the Phœnician littoral and almost duplicating its history, is the Oman seaboard of eastern Arabia. Here again a fertile coastal plain sprinkled with its "hundred villages," edged with a few tolerable harbours, and backed by a high mountain wall with an expanse of desert beyond, produced a race of bold and skilful navigators,† who in the Middle Ages used their location between the Persian gulf and the Arabian sea to make themselves the dominant maritime power of the Indian ocean. With them maritime expansion was typically wide in its sweep and rapid in its development. Even before Mohammed's time they had reached India; but under the energizing influences of Islam, by 850 they had established a flourishing trade with China, for which they set up way-stations or staple-points in the Sunda islands.‡ First as voyagers and merchants, then as colonists, they came, bringing their wares and their religion to these distant shores. Marco Polo, visiting Sumatra in 1260, tells us the coast population was "Saracen," but this was probably more in religion than in blood. Oman ventures reached as far south as east. The trading stations of Makdishu and Barawa were established on the Somali coast of East Africa in 908, and Kilwa 750 miles further south in 925. In the seventeenth century the Oman Arabs dislodged the intruding Portuguese from all this coast belt down to the present northern boundary of Portuguese East Africa.

* D. G. Hogarth, 'The Nearer East,' pp. 111-112, 152. London: 1902.

† Ibid., pp. 73-74, 139, 267.

‡ H. Helmolt, 'History of the World,' vol. 2, p. 548. New York: 1904.

Even so late as 1850 their capital, Maskat, sent out fine merchantmen that did an expensive carrying trade, and might be seen loading in the ports of British India, in Singapore, Java, and Mauritius.

Brittany's active part in the maritime history of France is due, not only to its ragged contour, its inshore and offshore islands, its forward location on the Atlantic which brought it near to the fisheries of Newfoundland and the trade of the West Indies, but also to the fact that the "Golden Belt," which, with but few interruptions, forms a band of fertility along the coast, has supported a denser population than the sterile granitic soils of the interior,* while the sea near by varied and enriched the diet of the inhabitants by its abundance of fish, and in its limy seaweed yielded a valuable fertilizer for their gardens.† The small but countless alluvial deposits at the fiord heads in Norway, aided by the products of the sea, are able to support a considerable number of people. Hence the narrow coastal rim of that country shows always a density of population double or quadruple that of the next density belt towards the mountainous interior, and contains seventeen out of Norway's nineteen towns having more than 5000 inhabitants.‡ It is this relative fertility of the coastal regions, as opposed to the sterile interior, that has brought so large a part of Norway's people in contact with the Atlantic and given them a prominent place in maritime history.

Occasionally an infertile and sparsely inhabited littoral bordering a limited zone of singular productivity, especially if favourably located for international trade, will develop marked maritime activity, both in trade and commercial colonization. Such was Arabian Yemen, the home of the ancient Sabæans on the Red sea, stretching from the Straits of Bab-el-Mandeb north-westward for 500 miles. Here a mountain range, rising to 10,000 feet and bordering the plateau desert of central Arabia, condenses the vapours of the summer monsoon and creates a long-drawn oasis, where terraced coffee gardens and orchards blossom in the hot, moist air; but the arid coastal strip at its feet, harbouring a sparse population only along its trickling streams, has developed a series of considerable ports as outlets for the abundant products and crowded population of the highlands.§ A location on the busy sea lane leading from the Indian ocean to the Mediterranean, near the meeting-place of three continents, made the merchants of the Yemen coast, like the

* E. Lavisse, 'Histoire de France,' vol. 1, by P. Vidal de la Blache, 'Géographie de la France,' pp. 335-337. Paris: 1903.

† Elisée Reclus, 'The Earth and its Inhabitants: Europe,' vol. 2, p. 252. New York: 1882.

‡ Norway, Official Publication for the Paris Exhibition, pp. 89-91, map of population, p. 4. Christiania: 1900.

§ D. G. Hogarth, 'The Nearer East,' pp. 114, 140, 163, 164, 202, 267. London: 1902.

Oman Arabs to the north, middlemen in the trade of Europe with eastern Africa and India.* Therefore, even in the second century these Sabæans had their trading stations scattered along the east coast of Africa as far south as Mozambique.† In 1502 Vasco da Gama found Arabs, either of Oman or Yemen, yet farther south in Sofala, the port for the ivory and gold trade. Some of them he employed as pilots to steer his course to India.‡

History makes one fact very plain: a people who dwell by the sea, and to whom nature applies some lash to drive them out upon the deep, command opportunity for practically unlimited expansion. In this way small and apparently ill-favoured strips of the Earth's surface have become the seats of wide maritime supremacy and colonial empire. The scattered but extensive seaboard possessions of little Venice and Genoa in the latter centuries of the Middle Ages are paralleled in modern times by the large oversea dominions of the English and Dutch.

Seaward expansions of peoples are always of great moment and generally of vast extent, whether they are the coastward movements of inland peoples to get a foothold upon the great oceanic highway of trade and civilization, as has been the case with the Russians notably since the early eighteenth century, and with numerous interior tribes of West Africa since the opening of the slave trade; or whether they represent the more rapid and extensive coastwise and oversea expansions of a maritime nation like the English, Dutch, and Portuguese. In either event they give rise to widespread displacements of peoples and a bizarre arrangement of race elements along the coast. When these two contrary movements meet, the shock of battle follows, as the recent history of the Russians and Japanese in Manchuria and Korea illustrates, the wars of Swedes and Russians for the possession of the eastern Baltic littoral, and the numerous minor conflicts that have occurred in Upper Guinea between European commercial powers and the would-be trading tribes of the bordering hinterland.

A coast region is always a peculiar habitat, inasmuch as it is more or less dominated by the sea. It is exposed to inundation by tidal wave and to occupation by immigrant fleets. It may be the base for outgoing maritime enterprise or the objective of some oversea movement, the dispenser or the recipient of colonists. The contrast between the inhabitants of the coast and the near-by inland people, which exists so widely, is to be traced, not so often to a difference of environment as to the more fundamental difference of race or tribe caused by immigration to accessible shores. The Greeks, crowded in their narrow peninsula of

* Strabo, book xvi. ch. iv. 2, 19.

† H. Helmolt, 'History of the World,' vol. 3, p. 433. New York: 1903.

‡ James Bryce, 'Impressions of South Africa,' pp. 79-82, 99. New York: 1897.

limited fertility, wove an Hellenic border on the skirts of the Black sea and eastern Mediterranean lands, just as the Carthaginians added a fringe of aliens to North Africa, where the Punic people of the coast presented a marked contrast to the Berbers of the interior. Detached from its hinterland, it developed an almost purely maritime history,* except when some tide of conquest or migration from the nomad-breeding plateau overwhelmed the littoral.

An ethnographical map of Russia to-day shows a narrow but almost continuous rim of Germans stretching from the river Niemen north through the Baltic coast of Courland, Livland, and Esthland, as far as Revel; and again, a similar band of Swedes along the seaboard of Finland, from a point east of Helsingfors on the south around to Uleaborg on the north,† dating from the time when Finland was a political dependency of Sweden, and influenced by the fact that the frozen Gulf of Bothnia every winter makes a bridge of ice between the two shores.

Everywhere in the Melanesian archipelago, where Papuans and Malays dwell side by side, the latter as the new-comers are always found in possession of the coast, while the darker aborigines have withdrawn into the interior. So in the Philippines, the aboriginal Negritos, pure or more often mixed with Malayan blood, as in the Mangyan tribe of central Mindoro, are found crowded back into the interior by the successive invasions of Malays who have encircled the coasts. The Zamboanga peninsula of Mindanao has an inland pagan population of the primitive Malayan race called Subanon, who have been displaced from the littoral by the seafaring Samal Moros, Mohammedanized Malays from the east shores of Sumatra and the adjacent islands, who spread northward about 1300 under the energizing impulse of their new religion.‡ Even at so late a date as the arrival of Magellan, the Subanon seem to have still occupied some points of the coast,§ just as the savage Ainos of the island of Yezo touched the sea about Sapporo only forty years ago, though they are now surrounded by a seaboard rim of Japanese.||

If we turn to South America, we find that warlike Tupi, at the time of the discovery, occupied the whole Brazilian coast from the southern tropic north to eastern Guiana, where the Tupi element is still strong, while the highlands of eastern Brazil immediately in their rear were populated by tribes of Ges, who had been displaced by the coastwise

* Ernst Curtius, 'History of Greece,' vol. 1, pp. 12-13. New York.

† Anatole Leroy Beaulieu, 'The Empire of the Tsars,' vol. 1. Map facing p. 80. New York.

‡ Philippine Census, vol. 1, pp. 412, 413, 461, 464, 562. Washington: 1905.

§ Ibid., vol. 1, p. 416.

|| F. Ratzel, 'History of Mankind,' vol. 3, p. 449. London: 1898.

expansion of the Tupi canoemen.* And to-day this same belt of coast-land has been appropriated by a foreign population of Europeans and Negroes, whilst the vast interior of Brazil shows a predominance of native Indian stocks, only broken here and there by a lonely *enclave* of Portuguese settlement. The early English and French territories in America presented this same contrast of coast and inland people—the colonists planting themselves on the hem of the continent to preserve maritime connection with the home countries, the aborigines forced back beyond reach of the tide.

Wherever an energetic seafaring people with marked commercial or colonizing bent makes a highway of the deep, they give rise to this distinction of coast and inland people on whatever shores they touch. The Phœnicians and Greeks did it in the Mediterranean; the expanding Angles and Saxons in the North sea and the Channel, where they stretched their *litus Saxonicum* along the coast of the continent to the apex of Brittany, and along the hem of England from Southampton Water to the Firth of Forth;† the sea-bred Scandinavians farther north in the Teutonic fringe of settlements which they placed on the shores of Celtic Scotland and Ireland.‡

As a rule it is the new-comers who hold the coast, but occasionally the coast-dwellers represent the older ethnic stock. In the Balkan peninsula to-day the descendants of the ancient Hellenes are, with few exceptions, confined to the coast. The reason is to be found in the fact that the Slavs and other northern races who have intruded by successive invasions from the plains of southern Russia are primarily an inland people, and therefore have occupied the core of the peninsula, forcing the original Greek population before them to the edge of the sea.§ This is the same anthropogeographical process which makes so many peninsulas the last halting-place of a dislodged earlier race. But the Greeks who line the northern and western shores of Asiatic Turkey are such only in language and religion, because their prevailing broad head-form shows them to be Turks and Armenians in race stock.||

Sometimes the distinction of race between coast and interior is obliterated so far as language and civilization are concerned, but survives less conspicuously in head-form and pigmentation. The outermost fringe of the Norwegian coast, from the extreme south to the

* H. Helmolt, 'History of the World,' vol. 1, p. 185. Ethnographical map. New York: 1902. Paul Ehrenreich, "Die Eintheilung und Verbreitung der Völkerstämme Brasiliens," *Petermanns Mittheilungen*, vol. 37, pp. 88, 89. Gotha: 1891.

† J. R. Green, 'The Making of England,' vol. 1, ch. i. "The Conquest of the Saxon Shore." London: 1904.

‡ H. J. Mackinder, 'Britain and the British Seas,' p. 189. London: 1904. W. Z. Ripley, 'The Races of Europe,' pp. 313–315, map. New York: 1899.

§ D. G. Hogarth, 'The Nearer East,' p. 152. London: 1902. W. Z. Ripley, 'The Races of Europe,' pp. 402, 404, map. New York: 1899.

|| *Ibid.*, pp. 117, 404, 405, 409, 410.

latitude of Trondhjem in the north, is occupied by a broad-headed, round-faced, rather dark people of only medium height, who show decided affinities with the Alpine race of Central Europe, and who present a marked contrast to the tall narrow-headed blondes of pure Teutonic type, constituting the prevailing population from the inner edge of the coast eastward into Sweden. This brachycephalic, un-Germanic stock of the western Norwegian coast seems to represent the last stand made by that once wide-spread Alpine race which here has been shoved along to the rocky capes and islands of the outer edge by a later immigration of German stock coming from Sweden.* So the largest continuous area of Negrito stock in the Philippines is found in the Sierra Madre mountains defining the eastern coast of northern Luzon.† Facing the neighbourless wastes of the Pacific, whence no new settler could come, turned away from the sources of Malay immigration to the south-west, it was given a location to make it a retreat, rather than a gateway to incoming races.

Where an immigrant population from oversea lands occupies the coastal hem of a country, rarely do they preserve the purity of their race. Coming at first with marauding or trading intent, they bring no women with them, but institute their trading stations or colonies by marriage with the women of the country. The ethnic character of the resultant population depends upon the proportion of the two constituent elements, the nearness or remoteness of their previous kinship, and the degree of innate race antagonism. The various Greek elements which crossed the Ægean from different sections of the peninsula to colonize the Ionic coast of Asia Minor mingled with the native Carian, Cretan, Lydian, Pelasgian, and Phœnician populations which they found there.‡ On all the barbarian shores where the Greeks established themselves, there arose a mixed race—in Celtic Massilia, in Libyan Barca, and in Scythian Crimea—but always a race Hellenized, born interpreters and mercantile agents.§ A maritime people, engrossed chiefly with the idea of trade, moves in small groups and intermittently; hence it modifies the original coastal population less than does a genuine colonizing nation, especially as it prefers the smallest possible territorial base for its operations. The Arab element in the coast population of East Africa is strongly represented, but not so strongly as one might expect after a thousand years of intercourse, because it was scattered in detached seaboard points, only few of which were really stable. The native population of Zanzibar and Pemba and the fringe of coast tribes on the mainland opposite are clearly tinged with Arab blood. These Swahili, as they

* W. Z. Ripley, 'The Races of Europe,' pp. 206–208, 210–212. Norway, Official Publication for the Paris Exhibition, pp. 80–81. Christiania: 1900.

† Philippine Census, vol. 2, p. 52, map, p. 50. Washington: 1905.

‡ Grote, 'History of Greece,' vol. 3, pp. 175, 176, 186–189. New York: 1857.

§ Ernst Curtius, 'History of Greece,' vol. 1, book ii. pp. 492–493. New York.

are called, are a highly mixed race, as their negro element has been derived not only from the local coast peoples, but also from the slaves who for centuries have been halting here on their seaward journey from the interior of Africa.*

Coast peoples tend to show something more than the hybridism resulting from the mingling of two stocks. So soon as the art of navigation developed beyond its initial phase of mere coastwise travel, and began to strike out across the deep, all coast peoples bordered upon each other, and the sea became a common waste boundary between. Unlike a land boundary, which is in general accessible from only two sides and tends to show, therefore, only two constituent elements in its border population, a sea boundary is accessible from many directions with almost equal ease; it therefore draws from many lands, and gives its population a variety of ethnic elements and a cosmopolitan stamp. This, however, is most marked in great seaports, but from them it penetrates into the surrounding country. The whole southern and eastern coast population of England, from Cornwall to the Wash, received during Elizabeth's reign valuable accessions of industrious Flemings and Huguenots, refugees from Catholic persecution in the Netherlands and France.† Our north Atlantic states, whose population is more than half (50·9 per cent.) made up of aliens and natives born of foreign parents,‡ have drawn their elements from almost the whole circle of Atlantic shores, from Norway to Argentine and from Argentine to Newfoundland. Even the Southern States, so long unattractive to immigrants on account of the low status of labour, show a fringe of various foreign elements along the Gulf coast, the deeper tint of which on the census maps fades off rapidly towards the interior. The same phenomenon appears with Asiatic and Australian elements in our Pacific seaboard states.§ The cosmopolitan population of New York, with its "Chinatown," its "Little Italy," its Russian and Hungarian quarters, has its counterpart in the mixed population of Maskat, peopled by Hindus, Arabs, Persians, Kurds, Afghans, and Beluchis, settled here for purposes of trade, or the equally mongrel inhabitants of Aden and Zanzibar, of Marseilles, Constantinople, Alexandria, Port Said, and so many other Mediterranean ports.

The cosmopolitanism and the commercial activity that characterize so many seaboard are reflected in the fact that, with rare exceptions, it is the coast regions of the world that give rise to a *lingua franca* or *lingua geral*. The original *lingua franca* arose on the coast of the Levant during the period of Italian commercial supremacy there; it consisted of an

* F. Ratzel, 'History of Mankind,' vol. 2, pp. 530-533. London: 1898.

† H. D. Trail, 'Social England,' vol. 3, pp. 367-368. London and New York: 1895.

‡ Twelfth Census, Bulletin, No. 103, table 23. Washington: 1902.

§ Ellen C. Semple, 'America and its Geographic Conditions,' pp. 314-315, 318-323, 326-328. Boston: 1903.

Italian stock, on which were grafted Greek, Arabic, and Turkish words, and was the regular language of trade for French, Spanish, and Italians.* It is still spoken in many Mediterranean ports, especially in Smyrna, and in the early part of the nineteenth century was in use from Madagascar to the Philippines.† In the coastal strip of the Zanzibar Arabs, recently transferred to German East Africa, the speech of the Swahili has become a means of communication over a great part of East Africa, from the coast to the Congo and the sources of the Nile. It is a Bantu dialect permeated with Arabic and Hindu terms, and sparsely sprinkled even with English and German words.‡ “Pidgin English” (business English) performs the function of a *lingua franca* in the ports of China and the Far East. It is a jargon of corrupted English with a slight mixture of Chinese, Malay, and Portuguese words, arranged according to the Chinese idiom. Another mongrel English does service on the coast of New Guinea. The “Nigger English” of the West African trade is a regular dialect among the natives of the Sierra Leone coast. Farther east, along the Upper Guinea littoral, the Eboe family of tribes who extend across the Niger delta from Lagos to Old Calabar have furnished a language of trade in one of their dialects.§ The Tupi speech of the Brazilian coast Indians, with whom the explorers first came into contact, became, in the mouth of Portuguese traders and Jesuit missionaries, the *lingua geral* or medium of communication between the whites and the various Indian tribes throughout Brazil.|| The Chinook Indians, located on our Pacific coast north and south of the Columbia river, have furnished a jargon of Indian, French, and English words which serves as a language of trade throughout a long stretch of the north-west Pacific coast, not only between whites and Indians, but also between Indians of different linguistic stocks.¶

The coast is the natural habitat of the middleman. One strip of seaboard produces a middleman people, and then sends it out to appropriate other littorals, if geographic conditions are favourable; otherwise it is content with the transit trade of its own locality. It breeds essentially a race of merchants, shunning varied production, nursing monopoly by secrecy and every method to crush competition. The profits of trade attract all the free population, and the labouring class is small or slave. Expansion landward has no attraction in comparison with the seaward expansion of commerce. The result is often a relative

* G. G. Chisholm, ‘Commercial Geography,’ p. 58. London: 1904.

† W. Roscher, ‘Nationalökonomik des Handels und Gewerbleisses,’ note 18, p. 85. Stuttgart: 1899.

‡ F. Ratzel, ‘History of Mankind,’ vol. 2, p. 533. London: 1898.

§ Ibid., vol. 3, pp. 139, 145.

|| H. R. Mill, ‘International Geography,’ p. 869. New York: 1902.

¶ D. G. Brinton, ‘The American Race,’ p. 107. Philadelphia: 1901.

dearth of local land-grown food stuffs. King Hiram of Troy, in his letter to King Solomon, promised to send him trees of cedar and cypress, made into rafts and conveyed to the coast of Philistia, and asked in return for grain, "which we stand in need of because we inhabit an island." The pay came in the form of wheat, oil, and wine. But Solomon furnished a considerable part of the labourers—30,000 of them—who were sent, 10,000 at a time, to Mount Lebanon to cut the timber, apparently under the direction of the more skilful Sidonian foresters.* A type of true coast traders is found in the Duallas of the German Kamerun, at the inner angle of the Gulf of Guinea. Located along the lower course and delta of the Mungo river where it flows into the Kamerun estuary, they command a good route through a mountainous country into the interior. This they guard jealously, excluding all competition, monopolizing the trade, and imposing a transit duty on all articles going to and from the interior. Like the ancient Phœnicians and Carthaginians, they avoid agriculture so far as possible. Their women and slaves produce an inadequate supply of bananas and yams, but crops needing much labour are wholly neglected, so that their coasts have a reputation for dearth of provisions.†

Along the 4500 miles of West African coast between the Senegal and the Kunene river the Negro's natural talent for trade has developed special tribes, who act as intermediaries between the interior and the European stations on the seaboard. Among these we find the Bihenos and Banda of Portuguese Benguela, who fit out whole caravans for the back country; the Portuguese of Loanda rely on the Ambaquistas and the Mbunda. The slave trade particularly brought a sinister and abnormal activity to these seaboard tribes,‡ just as it did to the East Coast tribes, and stimulated both in the exploitation of their geographic position as middlemen.§

The Alaskan coast shows the same development. The Kinik Indians at the head of Cook's inlet buy skins of land animals from the inland Athapascans at the sources of the Copper river, and then make a good profit by selling them to the American traders of the coast. These same Athapascans for a long time found a similar body of middlemen in the Ugalentz at the mouth of the Copper river, till the Americans there encouraged the inland hunters to bring their skins to the fur station on the coast.|| The Chilcats at the head of Lynn canal long monopolized the fur trade with the Athapaskan Indians about Chilkoot pass; these they would meet on the divide and buy their skins, which they would carry to the Hudson Bay Company agents on the coast. They guarded

* Josephus, 'Antiquities of the Jews,' book viii. ch. ii. 6, 7, 9.

† F. Ratzel, 'History of Mankind,' vol. 3, pp. 121, 122. London: 1898.

‡ Ibid., vol. 3, pp. 121, 132, 133.

§ Ibid., vol. 2, p. 239.

|| Eleventh Census Report, 'Alaska,' p. 70. Washington: 1893.

their monopoly jealously, and for fifty years were able to exclude all traders and miners from the passes leading to the Yukon.*

The same policy of monopoly and exclusion has been pursued by the Moro coast dwellers of Mindanao in relation to the pagan tribes of the interior. They buy at Moro prices the forest and agriculture products of the inland Malays, whom they do not permit to approach either rivers or seaboard, for fear they may come into contact with the Chinese merchants along the coast. So fiercely is their monopoly guarded by this middleman race, that the American Government in the Philippines will be able to break it only by military interference.†

Differences of occupation, of food supply, and of climate often further operate to differentiate the coast from the inland people near by, and to emphasize the ethnic difference which is almost invariably present, either inconspicuously from a slight infusion of alien blood, or plainly as in an immigrant race. Sometimes the contrast is in physique. In Finisterre province of western Brittany, the people along the more fertile coastal strip are on the average an inch taller than the inhabitants of the barren, granitic interior. Their more generous food supply, further enriched by the abundant fisheries at their doors, would account for this increased stature; but this must also be attributed in part to intermixture of the local Celts with a tall Teutonic stock which brushed along these shores, but did not penetrate into the unattractive interior.‡ So the negroes of the Guinea Coast, though not immune from fevers, since they are better nourished on the fertile alluvial lowlands near the abundant fish of the lagoons, are often stronger and better looking than the plateau interior tribes near by. But here, again, an advantageous blending of races can not be excluded as a contributing cause.§ Sometimes the advantage in physique falls to the inland people, especially in tropical countries when a highland interior is contrasted with a low coast belt. The wild Igorotes, inhabiting the mountainous interior of northern Luzon, enjoy a cooler climate than the lowlands, and this has resulted in developing in them a decidedly better physique and more industrious habits than are found in the civilized people of the coasts encircling them.||

Sometimes the difference is in shade of colour between two closely related tribes of the same race, due to the deeper pigmentation of the fishing, seafaring coast folk, especially in tropical regions. The coast Moros of western Mindanao are darker than the Subanos, their Malay brethren of the interior, the lightness of whose colour can be explained

* Eleventh Census Report, "Alaska," p. 156. Eliza R. Scidmore, 'Guidebook to Alaska,' p. 94. New York: 1897.

† Philippine Census, vol. 1, pp. 556-561, 575, 581-583. Washington: 1903.

‡ W. Z. Ripley, 'The Races of Europe,' pp. 85, 86, 99-101. With map, 151-152. New York: 1899.

§ F. Ratzel, 'History of Mankind,' vol. 3, pp. 97, 106. New York: 1898.

|| Henry Gannett, "The People of the Philippines," in Report of the Eighth International Geographic Congress. Washington: 1904.

by their spending most of their lives in the forests.* So the Duallas of the Kamerun coast are darker than the Bakwiri inhabiting the forest slope of the mountains just behind them, though both belong to the Bantu group of people.†

Where a coast people is an immigrant stock from some remote over-sea point, it brings to its new home a surplus of energy which was perhaps the basis of selection in the exodus from the mother country. Such a people is therefore characterized by greater initiative, enterprise, and endurance than the sedentary population which it left behind or that to which it comes; and these qualities are often further stimulated by the transfer to a new environment rich in opportunities. Sea-born in their origin, sea-born in their migration, they cling to the zone of littoral, because here they find the conditions which they best know how to exploit. Dwelling on the highway of the ocean, living in easy intercourse with distant countries which would have been far more difficult of access by land-travel over territories inhabited by hostile races, exchanging with these both commodities and ideas, food-stuffs and religions, they become the children of civilization, and their sun-burned seamen the sturdy apostles of progress. Therefore it may be laid down as a general proposition, that the coasts of a country are the first part of it to develop, not an indigenous or local civilization, but a cosmopolitan culture, which later spreads inland from the seaboard.

Exceptions to this rule are found in barren, swampy, or inaccessible coasts like the Pacific littoral of Peru and Mexico, and on shores like those of western Africa and eastern Luzon, which occupy an adverse geographic location facing a neighbourless expanse of ocean and remote from the world's earlier foci of civilization. Therefore the descent from the equatorial plateau of Africa down to the Atlantic littoral means a drop in culture also, because the various elements of civilization which, since the days of Phœnician and Yemen seamen, have uninterruptedly filtered in from the Mediterranean and the Red sea, have rarely penetrated so far as the western rim of the highland, and hence never reached the coast. So the remote Adriatic face of Greece received only faint echoes from the joyous choruses of *Ægean* civilization; so the western shores of the Iberian peninsula and of the British isles, during the ancient and mediæval periods of history, had their backs turned on the tumult of life and trade and progress about the Mediterranean and North sea shores.

The long, indented coast of the Mediterranean has in all ages presented the contrast of a littoral more advanced in civilization than the inland districts. The only possible exceptions are to be found in ancient Egypt before Psammeticus began to exploit his mud-choked seaboard, and in northern Italy of the last two decades, since the utilization of

* Philippine Census, vol. 1, p. 552. Washington: 1903.

† F. Ratzel, 'History of Mankind,' vol. 3, p. 106. London: 1898.

Alpine water-power. This contrast was apparent, not only wherever Phœnicians or Greeks had appropriated the remote coast of an alien and retarded people; even in near-by Thrace the savage habits of the interior tribes were softened only where these dwelt in close proximity to the Ionian colonies along the coast, a fact as noticeable in the time of Tacitus as in that of Herodotus five hundred years before.* The ancient philosophers of Greece were awake to the deep-rooted differences between an inland and a maritime city, especially in respect to receptivity of ideas, activity of intellect, and affinity for culture.†

If we turn to the Philippines, we find that 65 per cent. of the Christian or civilized population of the islands live on or near the coast; and of the remaining 35 per cent. dwelling inland, by far the greater part represents simply the landward extension of the area of Christian civilization which had Manila bay for a nucleus.‡ Otherwise, all the interior districts are occupied by wild or pagan tribes. Mohammedanism, too, a religion of civilization, rims the southernmost islands which face the eastern distributing point of the faith in Java; it is confined to the coasts, except for its one inland area of expansion along the lake and river system of the Rio Grande of Mindanao, which afforded an inland extension of sea navigation for the small Moro boat.

Coasts are areas of out-going and in-coming maritime influences. The nature and amount of these influences depend upon the sea or ocean whose rim the coast in question helps to form, and the relations of that coast to its other tide-washed shores. Our land-made point of view dominates us so completely, that we are prone to consider a coast as margin of its land, and not also as margin of its sea, whence, moreover, it receives the most important contributions to its development. The geographic location of a coast as part of a thalassic or of an oceanic rim is the most potent factor in its history; more potent than local conditions of fertility, irregular contour, and accessibility from sea and hinterland. Everything that can be said about the different degrees of historical importance attaching to inland seas and open oceans in successive ages applies equally to the countries and peoples along their shores; and everything that enhances or diminishes the cultural possibilities of a sea—its size, zonal location, its relation to the oceans and continents—finds its expression in the life along its coasts.

The anthropogeographical evolution which has passed from small to large states and from small to large seas as fields of maritime activity has been attended by a continuous change in the value of coasts according as these were located on enclosed basins like the Mediterranean, Red, and Baltic; on marginal ones like the China and North seas; or on the open ocean. In the earlier periods of the world's

* Grote, 'History of Greece,' vol. 4, p. 22. New York: 1857.

† Ibid., vol. 2, pp. 225, 226.

‡ Philippine Census, vol. 2, pp. 34, 35, map, p. 28. Washington: 1903.

history, a location on a relatively small enclosed sea gave a maritime horizon wide enough to lure, but not so wide as to intimidate; and by its seclusion led to a concentration and intensification of historical development, which in many of its phases left models for subsequent ages to wonder at and imitate. This formative period and formative environment outgrown, historical development was transferred to locations on the open oceans, according to the law of human advance from smaller to larger areas; so the historical importance of the Mediterranean and the Baltic shores was transitory, a prelude to the larger importance of the Atlantic littoral of Europe, just as this in turn was to attain its full significance only when the circumnavigation of Africa and South America linked the Atlantic to the World ocean. Thus that gradual expansion of the geographic horizon which has accompanied the progress of history has seen a slow evolution in the value of seaboard locations, the transfer of maritime leadership from small to large basins, from thalassic to oceanic ports, from Lubeck to Hamburg, from Venice to Genoa, as earlier from the Piræus to Ostia, and later from England's little *Cinque Ports* to Liverpool and the Clyde.

Though the articulations of a coast determine the ease with which maritime influences are communicated to the land, nevertheless history shows repeated instances where an exceptional location, combined with restricted area, has raised a poorly indented seaboard to maritime and cultural pre-eminence. Phœnicia's brilliant history rose superior to the limitation of indifferent harbours, owing to a position on the Arabian isthmus between the Mediterranean and the Indian ocean at the meeting-place of Europe, Asia, and Africa. Moreover, the advantages of this particular location have in various times and in various degrees brought into prominence all parts of the Syrian and Egyptian coasts from Antioch to Alexandria. So the whole stretch of coast around the head of the Adriatic, marking the conjunction of a busy sea-route with various land-routes over the encircling mountains from Central Europe, has seen during the ages a long succession of thriving maritime cities, in spite of fast-silting harbours and impeded connection with the hinterland. Here in turn have ruled with maritime sway Spina, Ravenna, Aquileia,* Venice, and Trieste. On the other side of the Italian peninsula, the location on the northernmost inlet of the western Mediterranean and at the seaward base of the Ligurian Apennines, just where this range opens two passes of only 1800 feet elevation to the upper Po valley, made an active maritime town of Genoa from Strabo's day to the present. In its incipieny it relied upon one mediocre harbour on an otherwise harbourless coast, a local supply of timber for its ships, and a road northward across the mountains.† The maritime ascendancy in the Middle Ages of Genoa, Pisa, Venice,

* Strabo, book v. ch. i. 7, 8.

† Strabo, book iv. ch. vi. 1, 2: book v. ch. i. 11.

and Barcelona proves that no long indented coast is necessary, but only one tolerable harbour coupled with an advantageous location.

Owing to the ease and cheapness of water transportation, a seaboard position between two other coasts of contrasted products, due to a difference either of zonal location or of economic development or of both combined, ensures commercial exchanges and the inevitable activities of the middleman. The position of Carthage near the centre of the Mediterranean enabled her to fatten on the trade between the highly developed eastern basin and the retarded western one. Midway between the teeming industrial towns of mediæval Flanders, Holland, and western Germany, and the new unexploited districts of unprogressive Russia, Poland, and Scandinavia, lay the long line of the German Hanseatic towns—Kiel, Lubeck, Wismar, Rostock, Stralsund, Greifswald, Anclam, Stettin, and Colberg, the *civitates maritimæ*, who for three centuries or more made themselves the dominant commercial and maritime power of the Baltic by exchanging Flemish fabrics, German hardware, and Spanish wines for the furs and wax of Russian forests, tallow and hides from Polish pastures, and crude metals from Swedish mines.* So Portugal by its geographical location became a staple place where the tropical products from the East Indies were transferred to the vessels of Dutch merchants, and by them distributed to northern Europe; later New England, by a parallel location, became the middleman in the exchanges of the tropical products of the West Indies, the tobacco of Virginia, and the wheat of Maryland for the manufactured wares of England and the fish of Newfoundland.

Primitive or early maritime commerce has always been characterized by the short beat, a succession of middlemen coasts, and a close series of staple places, such as served the North Indian ocean trade in Oman, Malabar coast, Ceylon, Coromandel coast, Malacca, and Java. Therefore, many a littoral admirably situated for middleman trade loses this advantage so soon as commerce matures enough to extend the sweep of its voyages, and to bring into direct contact the two nations for which that coast was intermediary. This is only another aspect of the anthropogeographic evolution from small to large areas. The decline of the Mediterranean coasts followed close upon the discovery of the sea-route to India; nor was their local importance restored by the Suez canal. Portugal declined when the Dutch, excluded from the Tagus mouth on the union of Portugal with Spain, found their way to the Spice isles. Ceylon, though still the chief port of call in the Indian ocean, has lost its pre-eminence as chief market for all the lands between Africa and China, which it enjoyed in the sixth century A.D., owing to the "long haul" of modern oceanic commerce.

Not only that far-reaching readjustment of maritime ascendancy

* Dietrich Schäfer, 'Die Hansestädte und König Waldemar von Danemark,' pp. 184, 189. Jena: 1879.

which in the sixteenth century followed the advance from thalassic to oceanic fields of commerce, but also purely local political events may produce as striking changes in the use or importance of coasts. The Piræus, which had been the heart of ancient Athens, almost wholly lost its value in the checkered political history of the country during the Middle Ages, when naval power and merchant marine almost vanished; but with the restoration of Grecian independence in 1832, much of its pristine activity was restored. Up to the beginning of the seventeenth century, Japan had exploited her advantageous location and her richly indented coast to develop a maritime trade which extended from Kamchatka to India; but in 1624 an imperial order withdrew every Japanese vessel from the high seas, and for over two hundred years robbed her busy littoral of all its historical significance. The real life of the Pacific coast of the United States began only with its incorporation into the territory of the Republic, but it failed to attain its full importance until our acquisition of Alaska, Hawaii, and the Philippines. So the coast of the Persian gulf has had periods of activity alternating with periods of deathlike quiet. Its conquest by the Saracens in the seventh century inaugurated an era of intense maritime enterprise along its drowsy shores: what new awakening may it experience, if it should one day become a Russian littoral!

Sometimes the decline in historical importance is due to physical modifications in the coast itself, especially where the mud transported by a great river to the sea is constantly pushing forward the shoreline. The control of the Adriatic passed in turn from Spina to Adria, Ravenna, Aquileia, Venice, and Trieste, owing to a steady silting up of the coast.* Strabo records that Spina, originally a port, was in his time 90 stadia, or 10 miles, from the sea.† Bruges, once the great *entrepôt* of the Hanseatic League, was originally on an arm of the sea, with which it was later connected by canal, and which has been silted up since 1432, so that its commerce, disturbed too by local wars, was transferred to Antwerp on the Scheldt.‡ Many early English ports on the coast of Kent and on the old solid rim of the Fenland marshes now lie miles inland from the Channel and the Wash.

A people never utilizes all parts of its coasts with equal intensity, or any part with equal intensity in all periods of its development; but, according to the law of differentiation, it gradually concentrates its energies in a few favoured ports, whose maritime business tends to become specialized; while every extension of the subsidiary territory and intensification of production with advance in civilization increases the mass of men and wares passing through these ocean gateways. The

* W. Deecke, 'Italy,' pp. 89-91. London: 1904.

† Strabo, book iii. ch. i. 2.

‡ W. Roscher, 'Nationalökonomik des Handels und Gewerbfleisses,' p. 93, note 1. Stuttgart: 1899.

shores of New York, Delaware, and Chesapeake bays are more important to the country now than they were in early colonial days, when their back country extended only to the watershed of the Appalachian system. Our Gulf coast has gained in activity with the South's economic advance from slave to free labour, and from almost exclusive cotton planting to diversified production combined with industries; and it will come into its own, in a maritime sense, when the opening of the Panama canal will divert from the Atlantic outlets those products of the Mississippi basin which will be seeking trans-Pacific markets.

A careful analysis of the life of coast peoples in relation to all the factors of their land and sea environment shows that these are multiform, and that none are negligible; it takes into consideration the extent, fertility, and relief of the littoral, its accessibility from the land as well as from the sea, and its location in regard to outlying islands and to opposite shores, whether near or far; it holds in view not only the small articulations that give the littoral ready contact with the sea, but its relation to the larger continental articulations, whether it lies on an outrunning spur of a continental mass, like the Malacca, Yemen, or Peloponesian coast, or upon a retiring inlet that brings it far into the heart of a continent, and provides it with an extensive hinterland; and, finally, it never ignores the nature of the bordering sea, which furnishes the school for the learning of seamanship and fixes the scope of maritime enterprise.

But all these various elements of coastal environment are differentiated in their use and their influence according to the purposes of those who come to tenant such tide-washed rims of the land. Pirates seek intricate channels and hidden inlets for their lairs; a merchant people select populous harbours and navigable river mouths; would-be colonists settle upon fertile valleys opening into quiet bays, till their fields, and use their coasts for placid maritime trade with the mother country; interior peoples, pushed or pushing out to the tidal periphery of their continent, with no maritime history behind them, build their fishing villages on protected lagoons, and, unless the shadowy form of some outlying island lure them farther, there they tarry, deaf to the siren song of the sea.

NOTES ON THE PHYSIOGRAPHY OF CERTAIN VOLCANOES IN NORTHERN JAPAN.

By C. E. BRUCE MITFORD.

OF the four "lines of weakness" which, marked by volcanic ranges, traverse the islands of Japan, the greatest is that which extends in a well-defined anticlinal curve from south-western Yezo along the backbone of Hondo to the lofty transverse upfold of the so-called Japanese Alps. At several points in this line subsidiary lines of fracture, running

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GEOGRAPHICAL LOCATION AS A FACTOR IN HISTORY.*

BY

ELLEN CHURCHILL SEMPLE.

The location of a country or people is always the supreme geographical fact in its history. It outweighs every other single geographic force. All that has been said of Russia's vast area, of her steppes and tundra wastes, of her impotent seaboard on land-locked basins or ice-bound coasts, of her poverty of mountains and wealth of rivers, fades into the background before her location on the border of Asia. From her defeat by the Tartar hordes in 1224 to her attack upon the Mongolian rulers of the Bosphorus in 1877, and her recent struggle with Japan, most of her wars have been waged against Asiatics. Location made her the bulwark of Central Europe against Asiatic invasion and the apostle of Western civilization to the heart of Asia. If this position on the outskirts of Europe, remote from its great centres of development, has made Russia only partially accessible to European culture and, furthermore, has subjected her to the retarding ethnic and social influences emanating from her Asiatic neighbours, and if the rough tasks imposed by her frontier situation have hampered her progress, these are all the limitations of her geographical location, limitations which not even the advantage of her vast area has been able to outweigh.

Area itself, important as it is, must yield to location. Location may mean only a single spot, and yet from this spot powerful influences may radiate. No one thinks of size when mention is made of Rome or Athens, of Jerusalem or Mecca, of Gibraltar or Port Arthur. Iceland and Greenland guided early Norse ships to the

* Read before the American Historical Association at Madison, Wisconsin, December 28, 1907. From a book in preparation on the Influences of Geographic Environment, based on Ratzel's system of anthropo-geography.

continent of America, as the Canaries and Antilles did those of Spain; but the location of the smaller islands in subtropical latitudes and in the course of the northeast trade-winds made them determine the first permanent path across the Western seas.

The historical significance of many small peoples, and the historical insignificance of many big ones even to the *nil* point, is merely the expression of the preponderant importance of location over area. The Phœnicians, from their narrow strip of coast at the foot of Mount Lebanon, were disseminators of culture over the whole Mediterranean. Holland owed her commercial and maritime supremacy, from the thirteenth to the middle of the seventeenth century, to her exceptional position at the mouth of the great Rhine highway and at the southern angle of the North Sea near the entrance to the unexploited regions of the Baltic. The Iroquois tribes, located where the Mohawk Valley opened a way through the Appalachian barrier between the Hudson River and Lake Ontario, occupied both in the French wars and in the Revolution a strategic position which gave them a power and importance out of all proportion to their numbers.

Location often assumes a fictitious political value, due to a combination of political interests. The Turkish power owes its survival on the soil of Europe to-day wholly to its position on the Bosphorus. Holland owes the integrity of her kingdom, and Roumania that of hers, to their respective locations at the mouths of the Rhine and the Danube, because the interest of western Europe demanded that these two important arteries of commerce should be held by powers too weak ever to tie them up. The same principle has guaranteed the neutrality of Switzerland, whose position puts it in control of all the passes of the Central Alps from Savoy to the Tyrol; and, more recently, that of the young state of Panama, through which the Isthmian Canal is to pass.

Geographical location necessarily includes the idea of the size and form of a country. Even the most general statement of the zonal and interoceanic situation of Canada, the United States, Mexico, and the Russian Empire, indicates the area and contour of their territories. This is still more conspicuously the case with naturally defined regions, such as island and peninsula countries. But location includes a complex of yet larger and more potent relations which go with mere attachment to this or that continent, or to one or another side of a continent. Every part of the world gives to its lands and its peoples some of its own qualities; and so

again every part of this part. Arabia, India and Farther India, spurs of the Asiatic land-mass, have had and will always have a radically different ethnic and political history from Greece, Italy and Spain, the corresponding peninsulas of Europe, because the histories of these two groups are bound up in their respective continents. The idea of a European state has a different content from that of an Asiatic, or North American or African state; it includes a different race or combination of races, different social and economic development, different political ideals. Location, therefore, means climate and plant life at one end of the scale, civilization and political status at the other.

This larger conception of location brings a correspondingly larger conception of environment, which affords the solution of many otherwise hopeless problems of anthropo-geography. It is embodied in the law that the influences of a land upon its people spring not only from the physical features of the land itself, but also from a wide circle of lands into which it has been grouped by virtue of its location. Almost every geographical interpretation of the ancient and modern history of Greece has been inadequate, because it has failed sufficiently to emphasize the most essential factor in this history, namely, Greece's location at the threshold of the Orient. This location has given to Greek history a strong Asiatic colour. It comes out in the accessibility of Greece to ancient Oriental civilization and commerce, and is conspicuous in every period from the Argonautic Expedition to the achievement of independence in 1832 and the recent efforts for the liberation of Crete. This outpost location before the Mediterranean portals of the vast and arid plains of southwestern Asia, exposed to every tide of migration or conquest sent out by those hungry lands, had in it always an element of weakness. In comparison with the shadow of Asia, which constantly overhung the Greek people and from 1401 to 1823 enveloped them, only secondary importance can be attributed to their advantageous local conditions as factors in Greek history.

It is a similar intercontinental location in the isthmian region between the Mediterranean on the west and the ancient maritime routes of the Red Sea and Persian Gulf on the east, which gave to Phœnicia the office of middleman between the Orient and Occident, and predestined its conquest, now by the various Asiatic powers of Mesopotamia, now by the Pharaohs of Egypt, now by European Greeks and Romans, now by a succession of Asiatic peoples, till to-day we find it incorporated in the Asiatic-European Empire of

Turkey. Proximity to Africa has closely allied Spain to the southern continent in flora, fauna, and ethnic stock. The long-headed, brunette Mediterranean race occupies the Iberian Peninsula and the Berber territory of northwest Africa.* This unity of race is also reflected in the political union of the two districts for long periods, first under the Carthaginians, then the Romans, who secured Hispania by a victory on African soil, and finally by the Saracens. This same African note in Spanish history recurs to-day in Spain's interest in Morocco and the influence in Moroccan affairs yielded her by France and Germany at the Algeciras convention in 1905.

In distinction to this continental or intercontinental location, anthropo-geography recognizes two other narrower meanings of the term. The innate mobility of the human race, due primarily to the eternal food quest and increase of numbers, leads a people to spread out over a territory till they reach the barriers which nature has set up, or meet the frontiers of other tribes and nations. Their habitat or their specific geographic location is thus defined by natural features of mountain, desert and sea, or by the neighbours whom they are unable to displace, or more often by both.

A people has, therefore, a twofold location, an immediate one, based upon their actual territory, and a mediate or vicinal one, growing out of its relations to the peoples nearest them. The first is a question of the soil under their feet; the other, of the neighbours about them. The first or natural location embodies the complex of local geographic conditions which furnish the basis for their tribal or national existence. This basis may be a peninsula, island, archipelago, an oasis, an arid steppe, a mountain system, or a fertile lowland. The stronger the vicinal location, the more dependent is the people on the neighbouring states, but the more potent the influence which it can, under certain circumstances, exert upon them. Witness Germany in relation to Holland, France, Austria and Poland. The stronger the natural location, on the other hand, the more independent is the people and the more strongly marked is the national character. This is exemplified in the people of mountain lands like Switzerland, Abyssinia and Nepal; of peninsulas like Korea, Spain and Scandinavia; and of islands like England and Japan. To-day we stand amazed at that strong primordial brand of the Japanese character which nothing can blur or erase.

Clearly defined natural locations, in which barriers of moun-

* W. L. Ripley, *The Races of Europe*, pp. 272-273. New York, 1899.

tains and sea draw the boundaries and guarantee some degree of isolation, tend to hold their people in a calm embrace, to guard them against outside interference and infusion of foreign blood, and thus to make them develop the national genius in such direction as the local geographic conditions permit. In the unceasing movements which have made up most of the historic and prehistoric life of the human race, in their migrations and counter-migrations, their incursions, retreats, and expansions over the face of the earth, vast unfenced areas, like the open lowlands of Russia and the grasslands of Africa, present the picture of a great thoroughfare swept by pressing throngs. Other regions, more secluded, appear as quiet nooks, made for a temporary halt or a permanent rest. Here some part of the passing human tide is caught as in a vessel and held till it crystallizes into a nation. These are the conspicuous areas of race characterization. The development of the various ethnic and political offsprings of the Roman Empire in the naturally defined areas of Italy, the Iberian Peninsula, and France illustrates the process of national differentiation which goes on in such secluded locations.

A marked influence in this development is generally ascribed to the protection afforded by such segregated districts. But protection alone is only a negative force in the life of a people; it leaves them free to develop in their own way, but does not say what that way shall be. On the other hand, the fact that such a district embraces a certain number of geographic features, and encompasses them by obstructive boundaries, is of immense historical importance; because this restriction leads to the concentration of the national powers, to the more thorough utilization of natural advantages, both racial and geographical, and thereby to the growth of an historical individuality. Nothing robs the historical process of so much of its greatness or weakens so much its effects as its dispersion over a wide, boundless area. This was the disintegrating force which sapped the strength of the French colonies in America. The endless valleys of the St. Lawrence and the Mississippi and the alluring fur trade tempted them to an expansion that was their political and economic undoing. Russia's history illustrates the curse of a distant horizon. On the other hand, out of a restricted geographical base, with its power to concentrate and intensify the national forces, grew Rome and Greece, England and Japan, ancient Peru and the Thirteen Colonies of America.

If even the most detached and isolated of these natural locations

be examined, its people will, nevertheless, reveal a transitional character, intermediate between those of its neighbours, because from these it has borrowed both ethnic stock and culture. Great Britain is an island, but its vicinal location groups it with the North Sea family of peoples. Even in historic times it has derived ancient Belgian stock, Roman, Anglo-Saxon, Danish and Scandinavian from the long semi-circle of nearby continental lands, which have likewise contributed so much to the civilization of the island. Similarly, Japan traces the sources of its population to the north of Asia by way of the island of Sakhalin, to the west through Korea, and to the Malay district of the south, whence the Kuro Siwa has swept stragglers to the shores of Kiu-siu. Like England, Japan also has drawn its civilization from its neighbours, and then, under the isolating influence of its local environment, has individualized both race and culture. Here we have the interplay of the forces of natural and vicinal location.

A people situated between two other peoples forms an ethnic and cultural link between the two. The transitional type is as familiar in anthropo-geography as in biology. The only exception is found in the young intrusion of a migrating or conquering people, like that of the Hungarians and Turks in southeastern Europe, and of the Berber Touaregs and Foulbes among the negroes of western Soudan; or of a colonizing people, like that of the Russians in Mongolian Siberia and of Europeans among the aborigines of South Africa. Even in these instances race amalgamation tends to take place along the frontiers, as was the case in Latin America and as occurs to-day in Alaska and northern Canada, where the "squaw man" is no rarity. The assimilation of culture, at least in a superficial sense, may be yet more rapid, especially where hard climatic conditions force the interloper to imitate the life of the native. The industrial and commercial Hollander, when transplanted to the dry grasslands of South Africa, became pastoral like the native Kaffirs. The French voyageur of Canada could scarcely be distinguished from the Indian trapper; occupation, food, dress, and spouse were the same. Only a lighter tint of skin distinguished the half-breed children of the Frenchman. The settlers of the early trans-Allegheny commonwealths, at least for a generation or two, showed little outward difference in mode of life from that of the savage community among which they dwelt.*

The more alike the components of such a vicinal group of people,

* Monette, *History of the Valley of the Mississippi*, Vol. II, Chap. I, 1846.

the easier, freer and more effective will be the mediating function of the central one. Germany has demonstrated this in her long history as intermediary between the nations of southeastern and western Europe. The kingdom of Poland, occupying a portion of the Baltic slope of northern Europe, fended by no natural barriers from its eastern and western neighbours, long constituted a transition form between the two. Though affiliated with Russia in point of language, the Poles are Occidental in their religion; and their head-form resembles that of northern Germany rather than that of Russia.* The country belongs to western Europe in the density of its population (74 to the square kilometre or 190 to the square mile), which is quadruple that of remaining European Russia, and also in its industrial and social development. The partition of Poland among the three neighbouring powers was the final expression of its intermediate location and character. One part was joined politically to the Slav-German western border of Russia, and another, to the German-Slav border of Germany, while the portion that fell to the Austrian Empire simply extended the northern Slav area of that country found in Bohemia and Moravia.

If the intermediate people greatly differs in race or civilization from both neighbours, it exercises and receives slight influence. The Mongols of Central Asia, between China on one side and Persia and India on the other, have been poor vehicles for the exchange of culture between these two great districts. The Hungarians, located between the Roumanians and Germans on the east and west, Slovaks and Croatians on the north and south, have helped little to reconcile race differences in the great empire of the Danube.

The unifying effect of vicinal location is greatly enhanced if the neighbouring people are grouped about an enclosed sea which affords an easy highway for communication. The integrating force of such a basin will often overcome the disintegrating force of race antagonisms. The Roman Empire in the Mediterranean was able to evolve an effective centralized government and to spread one culture over the neighbouring shores, despite great variety of nationality and language and every degree of cultural development. A certain similarity of natural conditions, climatic and otherwise, from the Iberian peninsula to the borders of the Syrian desert, also aided in the process of amalgamation.

Where similarity of race already forms a basis for congeniality, such circumthalassic groups display the highest degree of interactive

* W. L. Ripley, *Races of Europe*, p. 336, map p. 53. New York, 1899.

influence. These contribute to a further blending of population and unification of culture, by which the whole circle of the enclosing lands tends to approach one standard of civilization. This was the history of the Baltic coast from the thirteenth to the sixteenth centuries, when the German Hansa distributed the material products of Europe's highest civilization from Russian Novgorod to Norway. The North Sea group, first under the leadership of Holland, later under England's guidance, became a single community of advancing culture, which was a later reflection of the early community of race stretching from the Faroe and Shetland Islands to the Rhine and the Elbe. This same process has been going on for ages about the marginal basins of eastern Asia, the Yellow and Japan Seas. Community of race and culture stamps China, Korea and Japan. A general advance in civilization under the leadership of Japan, the England of the East, now inaugurates the elevation of the whole group.

An even closer connection exists between adjoining nations who are united by ties of blood and are further made economically dependent upon one another, because of a contrast in the physical conditions and, therefore, in the products of their respective territories. Numerous coast and inland tribes, pastoral and agricultural tribes are united because they are mutually necessary. In British Columbia and Alaska the fishing Indians of the seaboard long held a definite commercial relation to the hunting tribes of the interior, selling them the products and wares of the coast, while monopolizing their market for the inland furs. Such was the position of the Ugalentz tribe of Tlingits near the mouth of the Copper River in relation to the up-stream Athapascans; of the Kinik tribe at the head of Cook's Inlet in relation to the inland Atnas;* of the Chilcats of Chilkoot Inlet to the mountain Tinnehs. Similarly, the hunting folk of the Kalahari Desert in South Africa attach themselves to influential tribesmen of the adjacent Bechuana grasslands, in order to exchange the skins of the desert animals for spears, knives, and tobacco†. Fertile agricultural lands adjoining pastoral regions of deserts and steppes have in all times drawn to their border markets the mounted plainsmen, bringing the products of their herds to exchange for grain; and in all times the abundance of their green fields has lured their ill-fed neighbours to conquest, so that the economic bond becomes only a preliminary to a political

* Eleventh Census Report for Alaska, pp. 66, 67, 70. Washington, 1893.

† David Livingstone, *Travels in South Africa*, p. 56. New York, 1858.

bond and an ethnic amalgamation growing out of this strong vicinal location. The forest lands of Great Russia supplement the grain-bearing Black Lands of Little Russia; the two are united through geographico-economic conditions, which would not permit an independent existence to the smaller, weaker section of the south, ever open to hostile invasion from Asia.*

Leaving now the ethnic and economic ties which may strengthen the cohesive power of such vicinal grouping, and considering only its purely geographic aspects, we distinguish the following types:

I. Central location. Examples: • The Magyars in the Danube Valley; the Iroquois Indians on the Mohawk River and the Finger Lakes; Russia from the 10th to the 18th century; Poland from 1000 to its final partition in 1795; Bolivia.

II. Peripheral location: The Phoenicians; Greek colonies in Asia Minor and southern Italy; the Roman Empire at the accession of Augustus; the Thirteen Colonies in 1750.

III. Scattered location: English and French settlements in America prior to 1700; Chinese in the Malay Archipelago; Indians in the United States and the Kaffirs in South Africa; Portuguese holdings in the Orient, and French in India.

IV. Location in a related series: Oasis states grouped along desert routes; islands along great marine routes.

All peoples in their geographical distribution tend to follow a social and political law of gravitation, in accordance with which members of the same tribe or race gather around a common centre or occupy a continuous stretch of territory, as compactly as their own economic status and the physical conditions of climate and soil will permit. This is characteristic of all mature and historically significant peoples who have risen to sedentary life, maintained their hold on a given territory, and, with increase of population, have widened their boundaries. The nucleus of such a people may be situated somewhere in the interior of a continent, and with growing strength it may expand in every direction; or it may originate on some advantageous inlet of the sea and spread thence up and down the coast, till the people have possessed themselves of a long-drawn hem of land and used this peripheral location to intercept the trade between their back country and the sea.

These are the two types of continuous location. In contrast to them, a discontinuous or scattered location characterizes the sparse distribution of primitive hunting and pastoral tribes; or the shattered

* Anatole Leroy-Beaulieu, *The Empire of the Tsars*, Vol. I, pp. 36, 108. New York, 1893.

fragments of a conquered people, whose territory has been honey-combed by the land appropriation of the victors; or of a declining, moribund people, who, owing to bad government, poor economic methods, and excessive competition in the struggle for existence, have shrunk to mere patches. As a favorable symptom, a scattered location regularly marks the healthy growth of an expanding people, who throw out here and there detached centres of settlement far beyond the compact frontier and fix these as the goal for the advance of their boundary; and it is also a familiar feature of maritime commercial expansion, which is guided by no territorial ambition but aims to secure merely widely distributed trading stations at favorable coast points, in order to make the circle of commerce as ample and resourceful as possible. But this latter form of scattered location is not permanently sound. Back of it lies the short-sighted policy of the middleman nation, which makes wholly inadequate estimate of the value of land, and is content with an ephemeral prosperity.

A broad territorial base and security of possession are the guarantees of national survival. The geographic conditions which favor one often operate against the other. Peripheral location means a narrow base but a protected frontier along the sea; central location means opportunity for widening the territory, but it also means danger. A state embedded in the heart of a continent has, if strong, every prospect of radial expansion and of the exercise of widespread influence; but if weak, its very existence is imperilled, because it is exposed to encroachments on every side. A central location minus the bulwark of natural boundaries enabled the kingdom of Poland to be devoured piecemeal by its voracious neighbours. The kingdom of Burgundy, always a state of fluctuating boundaries and shifting allegiances, fell at last a victim to its central location, and saw its name obliterated from the map. Hungary, which, in the year 1000, occupied a restricted inland location on the middle Danube, by the 14th century broke through the barriers of its close-hugging neighbours, and stretched its boundaries from the Adriatic to the Euxine; two hundred years later its territory contracted to a fragment before the encroachments of the Turks, but afterwards recovered in part its old dimensions. Germany has, in common with the little Soudanese state of Bornu, an influential and dangerous position. The location of the Central European states between the Baltic and the Balkans has exposed them to all the limitations and dangers arising from a narrow circle of land neighbours. Moreover,

the diversified character of the country, its complex mountain systems, and diverging river courses have acted as disintegrating forces which have prevented the political concentration necessary to repel interference from without. The Muscovite power, which had its beginning in a modest central location about the sources of the Dwina, Dnieper and Volga, was aided by the physical unity of its unobstructed plains, which facilitated political combination. Hence, on every side it burst through its encompassing neighbours and stretched its boundaries to the untenanted frontier of the sea. Central location was the undoing of the Transvaal Republic. Its efforts to expand to the Indian Ocean were blocked by its powerful British neighbour at every point—at Delagoa Bay in 1875 by treaty with Portugal, at Santa Lucia Bay in 1884, and through Swaziland in 1894. The Orange Free State was maimed in the same way when, in 1868, she tried to stretch out an arm through Basutoland to the sea.* Here even weak neighbours were effective to curtail the seaward growth of these inland states, because they were made the tools of one strong, rapacious neighbour. A central position teaches always the lesson of vigilance and preparedness for hostilities, as the Boer equipment in 1899, the military organization of Germany, and the bristling fortresses on the Swiss Alpine passes prove.

How intimate and necessary are the relations between central and peripheral location is shown by the fact that all states strive to combine the two. In countries like Norway, France, Spain, Japan, Korea and Chile, the peripheral location predominates, and therefore confers upon them at once the security and commercial accessibility which result from contact with the sea. Other countries, like Russia, Germany and Austro-Hungary, chiefly central in location, have the strategic and even the commercial value of their coasts reduced by the long, tortuous course which connects them with the open ocean. Therefore, we find Russia planning to make a great port at Ekaterina Harbor on the northernmost point of her Lapland coast, where an out-runner from the Gulf Stream ensures an ice-free port on the open sea.† An admirable combination of central and peripheral location is seen in the United States. Here the value of periphery is greatly enhanced by the interoceanic location of the country, and the danger of entanglements arising from a marked central location is reduced by the simplicity of the political neighbourhood. But our country has paid for this security by an historical

* James Bryce, *Impressions of South Africa*, pp. 147, 150, 170-173. New York, 1897.

† Alexander P. Engelhardt, *A Russian Province of the North*, pp. 135, 140-147, 165, 170. Translated from the Russian, London, 1899.

aloofness and poverty of influence. Civilized countries which are wholly central in their location are very few, only nine in all. Six of these are mountain or plateau states, like Switzerland and Abyssinia, which have used the fortress character of their land to resist conquest, and have preferred independence to the commercial advantages to be gained only by affiliation with their peripheral neighbours.

Central and peripheral location presuppose and supplement one another. One people inhabits the interior of an island or continent whose rim is occupied by another. The first suffers from exclusion from the sea and therefore strives to get a strip of coast. The coast people feel the drawback of their narrow hold upon the land, want a broader base in order to exploit fully the advantages of their maritime location, fear the pressure of their hinterland when the great forces there imprisoned shall begin to move; so they tend to expand inland to strengthen themselves and weaken the neighbour in their rear. The English colonies of America, prior to 1763, held a long cordon of coast, hemmed in between the Appalachian Mountains and the sea. Alarmed by threats of French encroachments from the interior, they expanded from this narrow peripheral base into the heart of the continent, and after the Revolution reached the Mississippi River and the northern boundaries of the Spanish Floridas. They now held a central location in relation to the long Spanish periphery on the Gulf of Mexico. True to the instincts of that location, they began to throw the weight of their vast hinterland against the weak coastal barrier. This gave way, either to forcible appropriation of territory or diplomacy or war, till the United States had incorporated in her own territory the peripheral lands of the Gulf from Florida Strait to the Rio Grande.

In Asia this same process has been perennial and on a far greater scale. The big arid core of that continent, containing many million square miles, has been charged with an expansive force. From the appearance of the Aryans in the Indus Valley and the Scythians on the borders of Macedonia, it has sent out hordes to overwhelm the peripheral lands from the Yellow Sea to the Black, and from the Indian Ocean to the White Sea.* To-day Russia is making history there on the pattern set by geographic conditions. From her most southerly province in Trans-Caspia, conquered a short twenty-five years ago, she is heading towards the Indian Ocean. The Anglo-Russian convention of August 31st, 1907, yielding to Russia all

* For full and able discussion, see H. J. Mackinder, 'The Geographical Pivot of History, in the *Geographical Journal*, April, 1904. London.

northern Persia as her sphere of influence, enables her to advance half way to the Persian Gulf, though British statesmen regard it as a check upon her ambition, because England has secured her claim to the littoral. But Russia by this great stride towards her goal is working with causes, satisfied to let the effects follow at their leisure. She has gained the best portion of Persia, comprising the six largest cities and the most important lines of communication radiating from the capital.* This country will make a solid base for her further advance to the Persian Gulf; and, when developed by Russian enterprise in railroad building and commerce, it will make a heavy weight bearing down upon the coast. The ponderous mass which is pressing down on England's Persian littoral reaches from Ispahan and Yezd to the far-away shores of the Arctic Ocean.

In the essentially complementary character of interior and periphery are rooted all these coastward and landward movements of expansion. Where an equilibrium seems to have been reached, the peoples who have accepted either the one or the other one-sided location have generally for the time being ceased to grow. Such a location has therefore a passive character. But the surprising elasticity of many nations may start up an unexpected activity which will upset this equilibrium. Where the central location is that of a small mountain community, like the Romansch people in the Graubünden Alps or the Igorots in the highland interior of Luzon, or the Veddas of central Ceylon, the passive character is plain enough. In the case of larger groups occupying a central location, it is often difficult to say whether progression or retrogression is to be their fate. As a rule, however, the expulsion of a people from a peripheral point of advantage and their confinement in the interior gives the sign of national decay, as did Poland's loss of her Baltic seaboard. Russia's loss of her Manchurian port and the resignation of her ambition on the Chinese coasts is at least a serious check. On the other hand, if a country enclosed by her neighbours succeeds in somewhere making a breach in the fence, the sign is hopeful. The century-old political slogan of Hungary, "To the sea, Magyars!" has borne fruit in the Adriatic harbor of Fiume, which is to-day the pride of the nation and in no small degree a basis for its hope of autonomy. The history of Montenegro took on a new phase when from its mountain seclusion it recently secured the short strip of seaboard which it had won and lost so often. Such peripheral holdings are the lungs through which states breathe.

* The Anglo-Russian Agreement, with map, in *The Independent*, October 10, 1907.

History and the study of race distribution reveal a mass of facts which represent the reaction between interior and periphery. Especially the story of discovery and colonization, from the days of ancient Greek enterprise in the Mediterranean to the recent German expansion along the Gulf of Guinea, shows the appropriation first of the rims of islands and continents, and later that of the interior. A difference of race and culture between inland and peripheral inhabitants meets us almost everywhere in the more retarded lands of the earth. In the Philippines, the wild people of Luzon, Mindoro and the Visayas are confined almost entirely to the interior, while civilized or Christianized Malays occupy the whole seaboard, except where the rugged Sierra Madre Mountains, fronting the Pacific in Luzon, harbor a sparse population of primitive Negritos.* For centuries Arabs held the coast of East Africa, where their narrow zone of settlement bordered on that of native blacks, with whom they traded. Even ancient Greece showed a wide difference in type of character and culture between the inland and maritime states. The Greek landsman was courageous and steadfast, but crude, illiterate, unenterprising, showing sterility of imagination and intellect; while his brother of the seaboard was active, daring, mercurial, imaginative, open to all the influences of a refining civilization.† Today the distribution of the Greeks along the rim of the Balkan peninsula and Asia Minor, in contrast to the Turks and Slavs of the interior, is distinctly a peripheral phenomenon.‡

The rapid inland advance from the coast of oversea colonists is part of that restless activity which is fostered by contact with the sea and supported by that command of abundant resources conferred by maritime superiority. The Anglo-Saxon invasion of England, as later the English colonization of America, seized the rim of the land, and promptly pushed up the rivers in sea-going boats far into the interior. But periphery may give to central region something more than conquerors and colonists. From its active markets and cosmopolitan exchanges there steadily filter into the interior culture and commodities, carried by peaceful merchant and missionary, who, however, are often only the harbingers of the conqueror. The accessibility of the periphery tends to raise it in culture, wealth, density of population, and often in political importance, far in advance of the centre.

The maritime periphery of a country receives a variety of over-

* Census of the Philippine Islands of 1903; Vol. I, p. 526; Vol. II, pp. 50-52 and map. Washington.

† Grote, *History of Greece*, Vol. II, pp. 225-226. New York, 1859.

‡ W. L. Ripley, *The Races of Europe*, pp. 402-410, map. New York, 1899.

sea influences, blends and assimilates these to its own culture, Hellenizes, Americanizes or Japanizes them, as the case may be, and then passes them on into the interior. Here no one foreign influence prevails. On the land boundaries the case is different. Each inland frontier has to reckon with a different neighbour and its undiluted influence. A predominant central location means a succession of such neighbours, on all sides friction which may polish or rub sore. The distinction between a many-sided and a one-sided historical development depends upon the contact of a people with its neighbours. Consider the multiplicity of influences which have flowed in upon Austria from all sides. But not all such influences are similar in kind or in degree. The most powerful neighbour will chiefly determine on which boundary of a country its dominant historical processes are to work themselves out in a given epoch. Therefore, it is of supreme importance to the character of a people's history on which side this most powerful neighbour is located. Russia had for several centuries such a neighbour in the Tartar hordes along its southeastern frontier, and, therefore, its history received an Asiatic stamp; so, too, did that of Austria and Hungary in the long resistance to Turkish invasion. All three states suffered in consequence a retardation of development on their western sides. This appeared later, after the turmoil on the Asiatic frontier had subsided, and the great centres of European culture and commerce beyond the Vistula and the March began to assert their powers of attraction. The young Roman Republic drew up its forces to face the threatening power of Carthage in the south, and thereby was forced into rapid maritime development; the Roman Empire faced north to meet the inroads of the barbarians, and thereby was drawn into inland expansion. All these instances show that a vital historical turning-point is reached in the development of every country when the scene of its great historical happenings shifts from one side to another.

In addition to the aggressive neighbour, there is often a more sustained force that may draw the activities of a people toward one, or another boundary of their territory. This may be the abundance of land and unexploited resources lying on a colonial frontier and attracting the unemployed energies of the people, such as existed till recently in the United States,* and such as is now transferring the most active scenes of Russian history to far-away Siberia. But a

* Frederick J. Turner, *The Significance of the Frontier in American History*, in the *Annual Report of the American Historical Association* for 1893, pp. 199-227. Washington, 1894.

stronger attraction is that of a higher civilization and dominant economic interests. So long as the known world was confined to the temperate regions of Europe, Asia and Africa, together with the tropical districts of the Indian Ocean, the necessities of trade between Orient and Occident and the historical prestige of the lands bordering on the Mediterranean placed in this basin the centre of gravity of the cultural, commercial and political life of Europe. The continent was dominated by its Asiatic corner, its every country took on an historical significance proportionate to its proximity and accessibility to this centre. The Papacy was a Mediterranean power. The Crusades were Mediterranean wars. Athens, Rome, Constantinople, Venice, and Genoa held in turn the focal positions in this Asiatic-European sea; they were on the sunny side of the continent, while Portugal and England lay in shadow. Only that portion of Britain facing France felt the cultural influences of the southern lands. The estuaries of the Mersey and Clyde were marshy solitudes, echoing to the cry of the bittern and the ripple of Celtic fishing-boat.

After the year 1492 inaugurated the Atlantic period of history, the western front of Europe superseded the Mediterranean side in the historical leadership of the continent. The Breton coast of France waked up, the southern seaboard dozed. The old centres in the Ægean and Adriatic became drowsy corners. The busy traffic of the Mediterranean was transferred to the open ocean, where, from Trafalgar to Norway, the western states of Europe held the choice location on the world's new highway. Liverpool, Hamburg, Rotterdam, Cherbourg and Cadiz were shifted from shadowy margin to illuminated centre. Every country of Europe felt the effect. The experience of Germany was typical of the change. From the 10th to the middle of the 16th century, this heir of the old Roman Empire was drawn towards Italy by every tie of culture, commerce and political ideal. This concentration of interest on its southern neighbour made it ignore a fact so important as the maritime development of its Hanse Towns, wherein lay the real promise of its future. The shifting of its historical centre of gravity to the Atlantic seaboard, where it now lies, came very late, retarded further by lack of national unity.

Location, therefore, while being the most important single geographic factor in history, is at the same time the one most subject to the vicissitudes attending the anthropo-geographical evolution of the earth. Its value changes with the transfer of the seats of the highest civilizations from tropical to temperate lands; from the

margin of small, enclosed seas to the hem of the world ocean; from small, naturally defined territories to large, elastic areas; from mere periphery to a combination of periphery and centre, commanding the freedom of the sea and the abundant resources of a large hinterland.

LAVA FLOWING INTO THE OCEAN.

After the volcanic outbreak of 1905-06 in Savaii Island of the Samoan group the Linnean Society of New South Wales gave to Mr. H. I. Jensen, Linnean Macleay Fellow of the Society in Geology, leave of absence to carry out investigations of these latest phenomena on the island. His report is published in the *Proceedings* of the Society for 1906 (No. 124, issued March 28, 1907). Some facts from Mr. Jensen's report are presented here, together with two of his photographs showing the building of a lava peninsula in the ocean (1) in the early stage of the work and (2) a few weeks later.

The flow of 1905-06 occurred in the northeastern part of the island and came from a new crater which formed a couple of miles to the north of Mt. Pule (crater lake) on the mountain slopes. The new crater is seven or eight miles from the sea in the shortest direction, but the lava, following a circuitous course, runs an even greater distance before reaching the sea. The new volcano attained an altitude of 2,000 feet. South and east of its crater are remnants of older craters, and north of it are a couple of small cones, about a thousand feet high, which have perfect craters and are composed of lava cinders.

The quantity of lava which emerged from the new volcano covered an area of about thirty square miles and flowed from the vent in a northeasterly direction. The thickness of this lava varies greatly, depending on the proximity to the volcano and the previous configuration of the country. Originally a deep valley reached almost to the present site of the active cone. The earlier flows followed this valley, and in it, for a distance of several miles, there is now a thickness of lava exceeding a thousand feet.

What was a deep valley only a few hundred feet above sea level now forms a huge bulging lava ridge above 1,500 feet high near the volcano and sloping gently towards the sea. This inclined lava plain was still rising when Mr. Jensen saw it, through the intercalation

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OCEANS AND ENCLOSED SEAS: A STUDY IN
ANTHROPO-GEOGRAPHY.*

BY

ELLEN CHURCHILL SEMPLE.

The water of the earth's surface, viewed from the standpoint of anthropo-geography, is one, whether it appears as atmospheric moisture, spring, river, lake, brackish lagoon, enclosed sea-basin or open ocean. Its universal circulation, from the falling of the dews to the vast sweep of ocean current, causes this inviolable unity. Variations in the geographical forms of water are superficial and constantly changing; they pass into one another by almost imperceptible gradations, shift their unstable outlines at the bidding of the mobile, restless element. In contrast to the land, which is marked by diversity of geologic structure and geographic form, the world of water is everywhere approximately the same, excepting only the difference in the mineral composition of sea water as opposed to that of spring and stream. Therefore, wherever man has touched it, it has moulded him in much the same way, given the same direction to his activities, dictated the use of the same implements and methods of navigation. As maritime trader or colonist, he has sailed to remote, unknown, yet familiar, coasts, and found himself as much at home as on his native shores. He has built up maritime empires, the centre of whose dominion, race and commerce, falls somewhere in the dividing yet uniting sea.

Man must be grouped with the air and water as part of the mobile envelope of the earth's surface. The mobility which maintains the unity of air and water has caused the unity of the human race. Abundant facilities of dispersal often give animal forms a wide or

* Read before the Association of American Geographers, Chicago, December 31, 1907.

cosmopolitan distribution. Man, by appropriating the mobile forces in the air and water to increase his own powers of locomotion, has become a cosmopolitan being, and made the human race reflect the unity of atmosphere and hydrosphere.

Always the eternal unrest of the moving waters has knocked at the door of human inertia to arouse the sleeper within; always the flow of stream and the ebb of tide have sooner or later stirred the curiosity of the land-born barbarian about the unseen destination of these marching waters. Rivers by the mere force of gravity have carried him to the shores of their common ocean, and placed him on this highway of the world. Then from his sea-girt home, whether island or continent, he has timidly or involuntarily followed the track which headland-dotted coast, or ocean current, or monsoon, or trade wind marked out for him across the pathless waters, so that at the gray dawn of history he appears as a cosmopolite, occupying every part of the habitable earth.

These sporadic oversea wanderings, with intervals of centuries or millenniums between, opened to his occupancy strange and remote lands, in whose isolation and new environment he developed fresh variations of mind, body and cultured achievements, to arm him with new weapons in the struggle for existence. The sea which brought him bars him for a few ages from his old home, till the tradition of his coming even is lost. Then with higher nautical development, the sea loses its barrier nature; movements of people and trade recross its surface to unite those who have been long severed and much differentiated in their mutual remoteness. The ensuing friction and mingling weed out the less fit variations of each, and combine in the new race the qualities able to fortify a higher type of man. Not only seas and oceans, but also mountains and deserts serve to isolate the migrant people who once has crossed them; but wastes of water raise up the most effective barriers.

The transformation of the ocean into a highway by the development of navigation is a late occurrence in the history of man and is perhaps the highest phase of his adaptation to environment, because an adaptation which has placed at his disposal that vast water area constituting three-fourths of the earth's surface from which he had previously been excluded. Moreover, it was adaptation to an alien and hostile element, whose violent displays of power recurrently stimulated the human adjustment between attack and defense. Because adaptation to the sea has been vastly more difficult than to the land, commensurate with the harder struggle it has brought greater

intellectual and material rewards. To this conquest of the sea must be assigned a peculiarly high place in history, because it has contributed to the union of the various peoples of the world, has formed a significant part of the history of man, whether that history is economic, social, political or intellectual. Hence history has always staged its most dramatic acts upon the margin of seas and oceans; here always the plot thickens and gives promise of striking and tremendous development. Rome of the seven hills pales before England of the "Seven Seas."

Universal history loses half its import, remains an aggregate of parts, fails to yield its significance as a whole, if it does not continually take into account the unifying factor of the seas. Indeed, no history is entitled to the name of universal unless it includes a record of human movements and activities on the ocean, side by side with those on the land. Our school text-books in geography present a deplorable hiatus, because they fail to make a definite study of the oceans over which man explores and colonizes and trades, as well as the land on which he plants and builds and sleeps.

The striking fact about the great world ocean to-day is the manifold relations which it has established between the dwellers on its various coasts. Marine cables, steamer and sailing routes combine to form a dense network of paths across the vast commons of the deep. Over these the commercial, political, intellectual, or even purely migrant activities of human life move from continent to continent. The distinctive value of the sea is that it promotes many-sided relations as opposed to the one-sided relation of the land. France on her eastern frontier comes into contact with people of kindred stock, living under similar conditions of climate and soil to her own; on her maritime border she is open to intermittent intercourse with all continents and climes and races of the world. To this sea border must be ascribed the share that France has taken in the history of North and South America, the West Indies, Northern and Equatorial Africa, India, China and the South Seas. So we find the great maritime peoples of the world, from the Phœnicians to the English, each figuring in the history of the whole world of its day, and helping weave into a web of universal history the stories of its various parts.

Man's normal contact with the sea is registered in his nautical achievements. If we enquire *where* the highest native efficiency in the art of navigation was attained before the spread of Mediterranean and European civilization, we find that this distinction be-

longs to the great island world of the Pacific and to the neighbouring lands of the Indian Ocean. Sailing vessels and outrigger boats of native design and construction characterize the whole sea-washed area of Indo-Malaysian civilization from Hindustan to the outermost isles of the Pacific. The eastern rim of Asia, also, belongs to this wide domain of nautical efficiency, and the coast Indians of southern Alaska and British Columbia may possibly represent an eastern spur of the same,* thrown out in very remote times and maintained by the advantageous geographic conditions of that indented, mountainous coast. Adjoining this area on the north is the long-drawn Arctic seaboard of the Eskimo, who unaided have developed in their sealskin kayak and bidarka sea-going craft unsurpassed for the purposes of marine hunting and fishing, and who display a fearlessness and endurance born of long and enforced intimacy with the deep. Driven by the frozen deserts of his home to seek his food chiefly in the water, the Eskimo, nevertheless, finds his access to the sea barred for long months of winter by the jagged ice-pack banked up along the shore.

The highest degree of intimacy is developed in that vast island-strewn stretch of the Pacific constituting Oceania.† Here where a mild climate enables the boatman race to make a companion of the deep, where every landscape is a sea-scape, where every diplomatic visit or war campaign, every trading journey or search for new coco-palm plantation means a voyage beyond the narrow confines of the home island, there dwells a race whose splendid chest and arm muscles were developed in the gymnasium of the sea; who, living on a paltry 515,000 square miles (1,320,300 square kilometres) of scattered fragments of land, but roaming over an ocean area of twenty-five million square miles, are not more at home in their palm-wreathed islets than on the encompassing deep. Migrations, voluntary and involuntary, make up their history. Their trained sense of locality, enabling them to make voyages several hundred miles from home, has been mentioned by various explorers in Polynesia. The Marshall Islanders set down their geographical knowledge in maps which are fairly correct as to bearings but not as to distances. The Ralick Islanders of this group make charts which include islands, routes and currents.‡ Captain Cook was deeply impressed by the geographical knowledge of the people of the South

* Ratzel, *History of Mankind*, vol. I, pp. 153-154; vol. II, pp. 91, 100. London, 1896-1898.

† Ratzel, *History of Mankind*, vol. I, pp. 166-170. London, 1896-1898.

‡ Captain Winkler, *Sea Charts Formerly Used in the Marshall Islands*, Smithsonian Report for 1899, translated from the *Marine Rundschau*, Berlin, 1898.

Seas. A native Tahitian made for him a chart containing 74 islands, and gave an account of nearly 60 more.* Information and directions supplied by natives have aided white explorers to many discoveries in these waters. Quiros, visiting the Duff Islands in 1606, learned the location of Ticopia, one of the New Hebrides group, three hundred miles away. Not only the excellent seamanship and the related pelagic fishing of the Polynesians bear the stamp of their predominant water environment; their mythology, their conception of a future state, the germs of their astronomical science, are all born of the sea.

Though the people living on the uttermost boundaries of this island world are 6,000 miles (or 10,000 kilometres) apart, and might be expected to be differentiated by the isolation of their island habitats, nevertheless they all have the same fundamental characteristics of physique, language and culture from New Guinea to Easter Isle, reflecting in their unity the oneness of the encompassing ocean over which they circulate.†

Midway between these semi-aquatic Polynesians and those Arctic tribes who are forced out upon the deep, struggle with it rather than associate with it, we find the inhabitants of the Mediterranean islands and peninsulas, who are favored by the mild climate and the tideless, fogless, stormless character of their sea. While such a body of water lures to intimacy, it does not breed a hardy or bold race of navigators; it is a nursery, scarcely a severe training school. Therefore we find that, except the far-famed Dalmatian sailors, who for centuries have faced the storms sweeping down from the Dinaric Alps over the turbulent surface of the Adriatic, Mediterranean seamanship does not command general confidence on the high seas. Therefore it is the German, English and Dutch steamship lines that are to-day the chief ocean carriers from Italian ports to East Africa, Asia, Australia, North and South America, despite the presence of native lines running from Genoa to Buenos Ayres, Montevideo and New York; just as it was the Atlantic states of Europe, and only these and all of these, except Germany, who, trained to venture out into the fogs and storms and unmarked paths of the *mare tenebrosum*, participated in the early voyages to the Americas. One after the other they came—Norwegians, Spaniards, Portuguese, English, French, Dutch, Swedes and Danes. The anthro-geographical principle is not invalidated by the fact that Spain and England were

* Captain James Cook, *Journal of First Voyage round the World*, pp. 70, 105, 221, 230. Edited by W. J. L. Wharton, London, 1893.

† Ratzel, *History of Mankind*, vol. I, pp. 161, 174. London, 1896-1898.

guided in their initial trans-Atlantic voyages by Italian navigators, like Columbus, Cabot and Amerigo Vespucci. The long maritime experience of Italy and its commercial relations with the Orient, reaching back into ancient times, furnished abundant material for the researches and speculations of such practical theorists; but Italy's location fixed the shores of the Mediterranean as her natural horizon, narrowed her vision to its shorter radius. Her obvious interest in the preservation of the old routes to the Orient made her turn a deaf ear to plans aiming to divert European commerce to trans-Atlantic routes. Italy's entrance upon the high seas was, therefore, reluctant and late, retarded by the necessity of outgrowing the old circumscribed outlook of the enclosed basin before adopting the wider vision of the open ocean. Venice and Genoa were crippled not only by the discovery of the sea route to India, but also by their adherence to old thalassic means and methods of navigation inadequate for the high seas. However, these Mediterranean sea folk are being gradually drawn out of their seclusion, as proved by the increase of Italian oceanic lines and the recent installation of an Hellenic steamship line between Piræus and New York.

The size of a sea or ocean is a definite factor in the power of a body of water to lure or repel maritime ventures, especially in the earlier stages of nautical development. A broken, indented coast means not only a longer and broader zone of contact between the inhabitants and the sea; it means also the breaking up of the adjacent expanse of water into so many alcoves, in which fisherman, trader and colonist may become at home, and prepare for maritime ventures farther afield. The enclosed or marginal sea lures earlier because it can be compassed by coastwise navigation; then by the proximity of its opposite shores and its usual generous equipment with islands, the next step to crosswise navigation is encouraged. For the earliest stages of maritime development, only the smaller articulations of the coast and the inshore fringe of sea inlets count. This is shown in the primitive voyages of the Greeks, before they had ventured into the Euxine or west of the forbidding Cape Malia; and in the "inside passage" navigation of the Indians of southern Alaska and British Columbia, who have never stretched their nautical ventures beyond the outermost rocks of their skerry-walled coast.

A second stage is reached when an enclosed basin is at hand to widen the maritime horizon, and when this larger field is fully exploited in all its commercial, colonial and industrial possibilities, as was done by the Phœnicians and Greeks in the Mediterranean, the

Hansa Towns in the Baltic, the Dutch and English in the North Sea. The third and final stage is reached when the nursery of the inshore estuary or gulf and the training school of the enclosed basin are in turn outgrown, and the larger maritime spirit moves on to the open ocean for its field of operation. It is a significant fact that the Norse, bred to the water in their fiords and channels behind their protecting "skerry-wall," then trained in the stormy basins of the North and Irish Seas, were naturally the first people of Europe to cross the Atlantic; because the Atlantic off their shores, narrowing like all oceans and seas towards the north, assumes almost the character of an enclosed basin. The distance from Norway to Greenland is only 1,800 miles, little more than that across the Arabian Sea between Africa and India. We trace, therefore, a certain analogy between the physical subdivisions of the world of water into inlet, marginal sea and ocean, and the anthro-geo-graphical gradations in maritime development.

The enclosed or marginal sea seems a necessary condition for the advance beyond coastwise navigation and the much later step to the open ocean. Continents without them, like Africa except for its northern face upon the Mediterranean and the Red Sea, have shown no native initiative in maritime enterprise. Africa was further cursed by the mockery of desert coasts along most of her scant thalassic front. In the Americas, we find the native races compassing a wide maritime field only in the Arctic, where the fragmentary character of the continent breaks up the ocean into Hudson's Bay, Davis Strait, Baffin Bay, Gulf of Boothia, Melville Sound and Bering Sea; and in the tropical Mediterranean of the Caribbean Sea and Gulf of Mexico. The excellent seamanship developed in the archipelagoes of southern Alaska and Chile remained abortive for maritime expansion, despite a paucity of local resources and the spur of hunger, owing to the lack of a marginal sea; but in the Caribbean basin, the Aruaks and later the Caribs spread from the southern mainland as far as Cuba.*

Enclosed or marginal seas are historically the most important subdivisions of the ocean prior to 1492. Apart from the widening of the maritime horizon which they give to their bordering people, each has the further advantage of constituting an area of close vicinal grouping and constant interchange of cultural achievements, by which the civilization of the whole basin tends to become elevated and unified. This unification frequently extends to race also, owing to the rapidity of maritime expansion and the tendency to ethnic

* Hans Helmolt, *History of the World*, vol. I, pp. 188-189, 193-195. New York, 1902-1906.

amalgamation characteristic of all coast regions. We recognize an area of Mediterranean civilization from the Isthmus of Suez to the Sacred Promontory of Portugal, and in this area a long-headed, brunette Mediterranean race, clearly unified as to stock, despite local differentiations of culture, languages and nations in the various islands, peninsulas and other segregated coastal regions of this sea.* The basin appears therefore as an historical whole; for in it a certain group of peoples concentrated their common efforts, which crossed and criss-crossed from shore to shore. Phœnicia's trade ranged westward to the outer coasts of Spain, and later Barcelona's maritime enterprises reached east to the Levant. Greece's commercial and colonial relations embraced the Crimea and the mouth of the Rhone, and Genoa's extended east to the Crimea again. The Saracens, on reaching the Mediterranean edge of the Arabian peninsula, swept the southern coasts and islands, swung up the western rim of the basin to the foot of the Pyrenees, and taught the sluggish Spaniards the art of irrigation practiced on the garden slopes of Yemen. The ships of the Crusaders from Venice, Genoa and Marseilles anchored in the ports of Mohammedanized Syria, brought the symbol of the cross back to its birthplace in Jerusalem, but carried away with them countless suggestions from the finished industries of the East. Here was give and take, expansion and counter-expansion, conquest and expulsion, all together making up a great sum of reciprocal relations embracing the whole basin, the outcome of that close geographical connection which every sharply defined sea establishes between the coasts which it washes.

The same thing has come to pass in the North Sea. Originally Celtic on its western or British side, as opposed to its eastern or Germanic coast, it has been wholly Teutonized on that flank also from the Strait of Dover to the Firth of Tay, and sprinkled with Scandinavian settlers from the Firth of Tay northward to Caithness.† The eleventh century saw this ethnic unification achieved, and the end of the Middle Ages witnessed the diffusion of the elements of a common civilization through the agency of commerce from Bruges to Bergen. The Baltic, originally Teutonic only on its northern and western shores, has in historical times become almost wholly Teutonic, including even the seaboard of Finland and much of the coast provinces of Russia.‡ Unification of civilization

* W. L. Ripley, *The Races of Europe*, pp. 128-130, 270-273, 387-390, 407, 444, 448. New York, 1899. G. Sergi, *The Mediterranean Race*, pp. 29-37. New York, 1901.

† H. J. Mackinder, *Britain and the British Seas*, pp. 189-190. London, 1904.

‡ Sydow-Wagner *Schul-Atlas, Völker und Sprachenkarten*, No. 13. Gotha, 1905. A. Leroy-Beaulieu, *The Empire of the Tsars*, map p. 80.

attended this unification of race. In its period of greatest historical significance from the 12th to the 17th century, the Baltic played the rôle of a northern Mediterranean. The countless shuttles of the Hanse ships wove a web of commercial intercourse between its remotest shores. Novgorod and Abö were in constant communication with Lubeck and Stralsund;* and Wisby, on the island of Gotland at the great crossroads of the Baltic,† had the focal significance of the Piræus in ancient Ægean trade.

If we turn to Asia, we find that even the unfavorable polar location of Bering Sea has, nevertheless, been unable to rob it entirely of historical significance. This is the one spot where a native American race has transplanted itself by its own natural expansion to Asiatic shores. The circular rim and island-dotted surface have guided Eskimo settlements to the coast of the Chukchen Peninsula, where they have become partly assimilated in dress and language to the local Chukchees.‡ The same conditions also facilitated the passage of a few Chukchees across Bering Strait to the Alaskan side. At Pak (or Peek) on East Cape and on Diomed Island, situated in the narrowest part of Bering Strait, are the great intercontinental markets of the polar tribes. Here American furs have for many decades been exchanged for the reindeer skins of northern Siberia and Russian goods from far-away Moscow.§ Only the enclosed character of the sea, reported by the Danish explorer Vitus Bering, tempted the land-bred Russians, who reached the north-western coast of Siberia at the middle of the 18th century, to launch their leaky boats of unseasoned timber, push across to the American continent, and make this whole Bering basin a Russian sea;|| just as a few decades before, when land exploration of Kamchatka had revealed the enclosed character of the Sea of Okhotsk, the Russian pioneers took a straighter course across the water to their Pacific outpost of Petropavlovsk near the southern end of the peninsula. But even before the coming of the Slavs to its shores, the Sea of Okhotsk seems to have been an area of commercial and ethnic intercourse from the Amur River in Siberia in a half circle to the east, through Sakhalin, Yezo, the Kurile Islands and southern Kamchatka,¶ noticeably where the rim of the basin presented the scantiest supply

* E. C. Semple, *The Development of the Hanse Towns in Relation to their Geographical Environment*, Bull. Amer. Geographical Soc., vol. XXXI, No. 3, 1899.

† Helen Zimmern, *The Hansa Towns*, pp. 24-25, 54-55. New York, 1895.

‡ Nordenskiöld, *The Voyage of the Vega*, pp. 565, 588, 591. New York, 1882.

§ *Ibid.* pp. 375, 403, 405, 487, 563.

|| Agnes Laut, *Sea Voyages of the Northern Ocean*, Harper's Monthly, January, 1906.

¶ Ratzel, *History of Mankind*, vol. III, pp. 446, 449, 450. London, 1896-1898.

of land and where, therefore, its meagre resources had to be eked out by fisheries and trade on the sea.

The vicinal location about an enclosed basin produces more rapidly a unification of race and culture, when some ethnic relationship and affinity already exists among the peoples inhabiting its shores. As in the ancient and mediæval Mediterranean, so in the Yellow Sea of Asia, the working of this principle is apparent. The settlement along its coasts of divergent but kindred peoples like the Chinese, Koreans and Japanese, allowed these to be easily assimilated to a Yellow Sea race and to absorb quickly any later infusion, like that of the Tatars and Manchus. China, by reason of its larger area, long-drawn coast, massive population, and early civilization, was the dominant factor in this basin; Korea and Japan were its culture colonies—a fact that justifies the phrase calling “China the Rome of the Far East.” Historical Japan began on the island of Kiu-siu, facing the Yellow Sea. Like Korea, it derived its writing, its fantastic medical notions, its industrial methods, some features of its government administration, its Buddhism and its religion of Confucius from the people about the lower Hoangho.* Three centuries ago Japan had its colonies on Korean soil, and for purposes of piracy and smuggling penetrated far up the rivers of China. Korea has kept in touch with China by an active trade and diplomatic relations through the centuries.

But to-day China is going to school to Japan. Since Japan renounced her policy of seclusion forty years ago along with her antiquated form of government, and since Korea has been forced out of her hermit life, the potency of vicinal location around this enclosed sea has been suddenly restored. The enforced opening of the treaty ports of Japan, Korea and China simply prepared the way for this basin to reassert its power to unite, and to unite now more closely and effectively than ever before, under the law of increasing territorial areas. The stimulus was first communicated to the basin from without, from the trading nations of the Occident and that new-born Orient rising from the sea on the California shores. Japan has responded most promptly and most actively to these over-sea stimuli, just as England has, of all Europe, felt most strongly the reflex influences from trans-Atlantic lands. The awakening of this basin has started, therefore, from its seaward rim; its star has risen in the east. It is in the small countries of the world that such stars rise. The compressed energies of Japan, stirred by over-sea

* *Ibid.*, vol. III, pp. 443, 444.

contact and an improved government at home, have overleaped the old barriers and are following the lines of slight resistance which this land-bound sea affords. Helped by the bonds of geographical conditions and of race, she has begun to convert China and Korea into her culture colonies. The on-looking world feels that the ultimate welfare of China and Korea can be best nurtured by Japan, which will thus pay its old debt to the Middle Kingdom.

Despite the fact that China's history has always had a decidedly inland character, that its political expansion has been landward, that it has practiced most extensively and successfully internal colonization, and that its policy of exclusion has tended to deaden its outlook towards the Pacific, nevertheless China's direct intercourse with the west and its westward-directed influence have never, in point of significance, been comparable with that towards the east and south. Here a succession of marginal seas offered easy water-paths dotted with way stations to their outermost rim in Japan, the Philippines and remote Australia. About the South China 'Sea, the Gulf of Siam, the Sulu, Celebes, and Java Seas, the coastal regions of the outlying islands have for centuries received Chinese goods and culture, and a blend of that obstinately assertive Chinese blood.

The strength of these influences has decreased with every increase of distance from the indented coasts and teeming, seafaring population of South China, and with every decrease in race affinity. They have left only faint traces on the alien shores of far-away Australia. The divergent ethnic stock of the widespread Malay world has been little susceptible to these influences, which are therefore weak in the remoter islands, but clearly discernible on the coasts of the Philippines,* Borneo, the nearer Sunda Islands, and the peninsula of Malacca, where the Chinese have had trading colonies for centuries.† But in the eastern half of Farther India, which is grouped with China by land as well as by sea, and whose race stock is largely if not purely Mongolian, these influences are very marked, so that the whole continental rim of the South China Sea, from Formosa to the Isthmus of Malacca, is strongly assimilated in race and culture. Tongking, exposed to those modifying influences which characterise all land frontiers, as well as to coastwise intercourse, is in its people and civilization merely a transcript of China. The coast districts and islands of Annam are occupied by Chinese as far as the hills of Cambodia, and the name of Cochin China points to the origin of its predominant population. One-sixth of the inhabitants

* Census of the Philippine Islands, 1903, vol. I, pp. 318-320, 478, 481-495.

† Hans Helmolt, *History of the World*, vol. II, pp. 544-545. New York, 1905.

of Siam are Chinese, some of whom have filtered through the northern border; Bangkok, the capital, has a large Chinese quarter. The whole economic life and no small part of the intellectual life of the eastern face of Farther India as far as Singapore is centered in the activity of the Chinese.*

The historical significance of an enclosed sea basin depends upon its zonal location and its location in relation to the surrounding lands. We observe a steady decrease of historical importance from south to north through the connected series of the Yellow, Japan, Okhotsk, Bering Seas and the Arctic basin, miscalled ocean. The far-northern location of the Baltic, with its long winters of ice-bound ports and its glaciated lands, retarded its inclusion in the field of history, curtailed its important historical period, and reduced the intensity of its historical life, despite the brave, eager activity of the Hanseatic League. The Mediterranean had the advantage, not only of a more favorable zonal situation, but of a location at the meeting place of three continents and on the line of maritime traffic across the eastern hemisphere from the Atlantic to the Pacific.

These advantages it shares in some degree with the Indian Ocean, which, as Ratzel justly argues, is not a true ocean, at best, only half an ocean. North of the Equator, where it is narrowed and enclosed like an inland sea, it loses the hydrospheric and atmospheric characteristic of a genuine ocean. Currents and winds are disorganized by the close-hugging lands. Here the steady northeast trade wind is replaced by the alternating air currents of the northeast and southwest monsoons, which at a very early date enabled merchant vessels to break away from their previous slow, coastwise path, and to strike a straight course on their voyages between the east coast of Africa and India.† Moreover, this northern half of the Indian Ocean looks like a larger Mediterranean with its southern coast removed. It has the same east and west series of peninsulas harbouring differentiated nationalities, the same northward running recesses, but all on a larger scale. It has linked together the history of Asia and Africa; and by the Red Sea and Persian Gulf, it has drawn Europe and the Mediterranean into its sphere of influence. At the western corner of the Indian Ocean a Semitic people, the Arabs of Oman and Yemen, here first developed brilliant maritime activity, like their Phœnician kinsmen of the Lebanon seaboard. Similar geographic conditions in their home regions and a nearly similar intercontinental location combined to make them the middlemen of two or three con-

* Ratzel, *History of Mankind*, vol. III, pp. 407-412. London, 1896-1898.

† Bunbury, *History of Ancient Geography*, vol. II, pp. 351, 470, 471. London, 1883.

tinents. Just as the Phoenicians, by way of the Mediterranean, reached and roused slumberous north Africa into historical activity and became the medium for the distribution of Egypt's culture, so these Semites of the Arabian shores knocked at the long-closed doors of east Africa facing on the Indian basin, and drew this region into the history of southern Asia. Thus the Africa of the enclosed seas was awakened to some measure of historical life, while the Africa of the wide Atlantic slept on.

From the dawn of history the northern Indian Ocean was a thoroughfare. Alexander the Great's rediscovery of the old sea route to the Orient sounds like a modern event in relation to the gray ages behind it. Along this thoroughfare Indian colonists, traders, and priests carried the elements of Indian civilization to the easternmost Sunda Isles, and Oriental wares, sciences and religions moved westward to the margin of Europe and Africa. The Indian Ocean produced a civilization of its own, with which it colored a vast semi-circle of land reaching from Java to Abyssinia, and more faintly, owing to the wider divergence of race, the further stretch from Abyssinia to Mozambique.

Thus the northern Indian Ocean, owing to its form, its location in the angle between Asia and Africa and the latitude where, round the whole earth, "the zone of greatest historical density" begins, and especially its location just southeast of the Mediterranean as the eastern extension of that great maritime track of ancient and modern times between Europe and China, has been involved in a long series of historical events. From the historical standpoint, prior to 1492 it takes a far higher place than the Atlantic and Pacific, owing to its nature as an enclosed sea.* But like all such basins, this northern Indian Ocean attained its zenith of historical importance in early times. In the 16th century it suffered a partial eclipse, which passed only with the opening of the Suez Canal. During this interval, however, the Portuguese, Dutch and English had rounded the Cape of Good Hope and entered this basin on its open or oceanic side. By their trading stations, which soon traced the outlines of its coasts from Sofala in South Africa around to Java, they made this ocean an alcove of the Atlantic, and embodied its events in the Atlantic period of history. It is this open or oceanic side which differentiates the Indian Ocean physically, and therefore historically, from a genuine enclosed sea.

The limitation of every enclosed or marginal sea lies in its small

* For a full discussion of the Indian Ocean, see Hans Helmolt, *History of the World*, vol. II, pp. 580-584, 602-610. New York, 1904-1907.

area and in the relatively restricted circle of its bordering lands. Only small peninsulas and islands can break its surface and short stretches of coast combine to form its shores. It affords, therefore, only limited territories as goals for expansion, restricted resources and populations to furnish the supply and demand of trade. What lands could the Mediterranean present to the colonial outlook of the Greeks comparable to the North America of the expanding English or the Brazil of the Portuguese? Yet the Mediterranean as a colonial field had great advantages in point of size over the Baltic, which is only one-sixth as large (2,509,500 and 431,000 square kilometres respectively), and especially over the Red Sea and Persian Gulf, whose effective areas were greatly reduced by the aridity of their surrounding lands. But the precocious development and early cessation of growth marking all Mediterranean national life have given to this basin a variegated history; and in every period and every geographical region of it, from ancient Phœnicia through the Roman Empire to modern Italy, the early exhaustion of resources and dwarfing of ideals which characterize small areas become more and more conspicuous. The history of Sweden, Denmark and the Hanse Towns in the Baltic, and of Yemen on the Red Sea tells the same story, the story of a hothouse plant, forced in germination and growth, then stifled in the close air.

Growth demands space. Therefore, the progress of history has been attended by an advance from smaller to larger marine areas, with a constant increase in those manifold relations between peoples and lands which the water is able to establish. Every great epoch of history has had its own sea, and every succeeding epoch has enlarged its maritime field. The Greek had the Ægean, the Roman the whole Mediterranean, to which the Mediæval made an addition in the North Sea and the Baltic. The modern period has had the Atlantic, and the 20th century is now entering upon the final epoch of the World Ocean. The gradual inclusion of this World Ocean in the widened scope of history has been due to the expansion of European peoples, who, for the past twenty centuries, have been the most far-reaching agents in the making of universal history. Owing to the location and structure of their continent, they have always found the larger outlet in a western sea. In the south the field widened from the Phœnician Sea to the Ægean, then to the Mediterranean, on to the Atlantic, and across it to its western shores; in the north it moved from the quiet Baltic to the tide-swept North Sea and across the North Atlantic. Only the South Atlantic

brought European ships to the great world highway of the South Sea, and gave them the choice of an eastern or western route to the Pacific. Every new voyage in the age of discovery expanded the historical horizon; and every improvement in the technique of navigation has helped to eliminate distance and reduced intercourse on the World Ocean to the time-scale of the ancient Mediterranean.

It would be a mistake, however, to suppose that the larger size of the oceanic horizon has meant a corresponding increase in the content and importance of history. Such an intense, concentrated national life as occurred in those little Mediterranean countries in ancient times is not duplicated now, unless we find a parallel in Japan's recent career in the Yellow Sea basin. There was something as cosmic in the colonial ventures of the Greeks to the wind-swept shores of the Crimea or barbarous wilds of Massilia, as in the establishment of English settlements on the brimming rivers of Virginia or the torrid coast of Malacca. The inner significance of Alexander's conquest of the Asiatic rim of the Mediterranean and Rome's political unification of the basin does not lose in comparison with the Russification of northern Asia and the establishment of the British Empire.

The ocean has always performed one function in the evolution of history; it has always provided the outlet for the exercise of redundant national powers. The abundance of opportunity which it presents to these disengaged energies depends upon the size, location and other geographic conditions of the bordering lands. These opportunities are limited in an enclosed basin, larger in the oceans, and largest in the northern halves of the oceans, owing to the widening of all land-masses towards the north and the consequent contraction of the oceans and seas in the same latitudes.

A result of this grouping is the abundance of land in the northern hemisphere, and the vast predominance of water in the southern, by reason of which these two hemispheres have each assumed a distinct rôle in history. The northern hemisphere offers the largest advantages for the habitation of man, and significantly enough, contains a population five times that of the southern hemisphere. The latter, on the other hand, with its vast, unbroken water areas, has been the great oceanic highway for circum-mundane exploration and trade. This great water girdle of the South Seas had to be discovered before the spherical form of the earth could be established. In the wide territory of the northern hemisphere civilization has experienced an uninterrupted development, first in the Old World,

because this offered in its large area north of the Equator the fundamental conditions for rapid evolution; then it was transplanted with greatest success to North America. The northern hemisphere contains, therefore, "the zone of greatest historical density," from which the track of the South Seas is inconveniently remote. Hence we find in recent decades a reversion to the old east-west path along the southern rim of Eurasia, now perfected by the Suez Canal, and to be extended in the near future around the world by the union of the Pacific with the Caribbean Sea at Panama; so that finally the northern hemisphere will have its own circum-mundane waterway, along the line of greatest intercontinental intercourse.

The size of the ocean as a whole is so enormous, and yet its various subdivisions are so uniform in their physical aspect, that their differences of size produce less conspicuous historical effects than their diversity of area would lead one to expect. A voyage across the 177,000 square miles (453,500 square kilometres) of the Black Sea does not differ materially from one across the 979,000 square miles (2,509,500 square kilometres) of the Mediterranean; or a voyage across the 213,000 square miles (547,600 square kilometres) of the North Sea, from one across the three-hundredfold larger area of the Pacific. The ocean does not, like the land, wear upon its surface the evidences and effects of its size; it wraps itself in the same garment of blue waves or sullen swell wherever it appears; but the outward cloak of the land varies from zone to zone. The most significant anthropo-geographical influence of the size of the oceans, as opposed to that of the smaller seas, comes from the larger circle of lands which the former open to maritime enterprise. For primitive navigation, when the sailor crept from headland to headland and from island to island, the small enclosed basin with its close-hugging shores did indeed offer the best conditions. To-day, only the great tonnage of ocean-going vessels may reflect in some degree the vast areas they traverse between continent and continent. Coasting craft and ships designed for local traffic in enclosed seas are in general smaller, as in the Baltic, though the enormous commerce of the Great Lakes, which constitute in effect an inland sea, demands the largest vessels.

The vast size of the oceans has been the basis of their neutrality. The neutrality of the seas is a recent idea in political history. The principle arose in connection with the oceans, and from them was extended to the smaller basins, which previously tended to be regarded as private political domains. Their limited area, which

enabled them to be compassed, enabled them also to be appropriated, controlled and even policed. The Greek excluded the Phœnician from the Ægean and made it an Hellenic sea. Carthage and Tarantum tried to draw the dead line for Roman merchantmen at the Lacinian Cape, the doorway into the Ionian Sea, and thereby involved themselves in the famous Punic Wars. The whole Mediterranean became a Roman sea, the *mare nostrum*. Pompey's fleet was able to police it effectively and to exterminate the pirates in a few months, as Cicero tells us in his oration for the Manilian Law. The Venetians wished dominion over the Adriatic to be confirmed to them by the Pope. Sweden and Denmark strove for a *dominium maris Baltici*; but the Hansa Towns of northern Germany secured the maritime supremacy in the basin, kept a toll-gate at its entrance, and levied toll or excluded merchant ships at their pleasure, a right which after the fall of the Hanseatic power was assumed by Denmark and maintained till 1857. "The Narrow Seas" over which England claimed sovereignty from 1299 to 1805, and on which she exacted a salute from every foreign vessel, included the North Sea as far as Stadland Cape in Norway, the English Channel, and the Bay of Biscay down to Cape Finisterre in northern Spain.*

At the beginning of the 16th century the Indian Ocean was a Portuguese sea, and Spain was trying to monopolize the Caribbean and even the Pacific Ocean. But the immense areas of these pelagic fields of enterprise, and the rapid intrusion into them of other colonial powers soon rendered obsolete in practice the principle of the *mare clausum*, and introduced that of the *mare liberum*. The political theory of the freedom of the seas seems to have needed vigorous support even toward the end of the 17th century. At this time we find writers like Salmasius and Hugo Grotius invoking it to combat Portuguese monopoly of the Indian Ocean as a *mare clausum*. Grotius in a lengthy dissertation upholds the thesis that "*Jure gentium quibusvis ad quosvis liberam esse navigationem*," and supports it by an elaborate argument and quotations from the ancient poets, philosophers, orators and historians.† This principle was not finally acknowledged by England as applicable to the "Narrow Seas" till 1805. Now, by international agreement, political domain extends only to one marine league from shore or within cannon range. The rest of the vast water area which comprises three-fourths of the earth's surface remains the unobstructed highway of the world.

* H. J. Mackinder, Britain and the British Seas, p. 24, note. London, 1904.

† *Hugonis Grotii, Mare Liberum sive de jure quod Batavis competit ad indicana commercia dissertatio*, contained in his *De Jure Belli et Pacis*. *Hagae Comitum, apud Arnoldum Leers*, 1680.

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believe. The core of the earth, if solid, must be so by reason of the pressure upon it, and a local relief of this pressure in the superficial portion due to a local uplift, would temporarily cause fusion of some of the rock, and so permit of lateral migrations. Mercalli's "inter-volcanic" type of earthquake is thus in all probability the normal one, and is connected with changes in level of the earth's surface. Wherever, therefore, portions of the continent are rapidly undergoing changes of level, and such are for the most part in the neighbourhood of the sea coast, there earthquakes must be expected.

It is vain to hope against hope that earthquakes will not return to regions which they have already visited in the past. It is quite within the range of possibility that more careful study by geologists of the rate of uplift within definite dangerous zones, may throw some light upon the future frequency and intensity of earthquakes, in those cases where historic records are insufficient for the purpose. In the writer's opinion, the study of earthquakes, from the geologist's view point, is certain to focus attention more and more upon study of the rate of oscillation of level measured in terms of wave-cutting on shores and of stream erosion as well. It was with studies of this nature that geology was concerned in its beginnings, but attention has since drifted away from the subject. There are, however, few problems of geology to-day so pregnant of important discoveries in the future.

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THE OPERATION OF GEOGRAPHIC FACTORS IN HISTORY.*

BY

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Man is a product of the earth surface. This means not merely that he is a child of the earth, dust of her dust; but that the earth has mothered him, fed him, set him tasks, directed his thoughts, confronted him with difficulties that have strengthened his body and sharpened his wits, given him his problems of navigation or irrigation, and at the same time whispered hints for their solution. She

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has entered into his bone and tissue, into his mind and soul. On the mountains she has given him leg muscles of iron to climb the slope; along the coast she has left these weak and flabby, but given him instead vigorous development of chest and arm to handle his paddle or oar. In the river valley she attaches him to the fertile soil, circumscribes his ideas and ambitions by a dull round of calm, exacting duties, narrows his outlook to the cramped horizon of his farm. Up on the wind-swept plateaus, in the boundless stretch of the grasslands and the waterless tracts of the desert, where he roams with his flocks from pasture to pasture and oasis to oasis, where life knows much hardship but escapes the grind of drudgery, where the watching of grazing herd gives him leisure for contemplation, and the wide-ranging life a big horizon, his ideas take on a certain gigantic simplicity; religion becomes monotheism, God becomes one, unrivalled like the sand of the desert and the grass of the steppe, stretching on and on without break or change. Chewing over and over the cud of his simple belief as the one food of his unfed mind, his faith becomes fanaticism; his big spacial ideas, born of that ceaseless regular wandering, outgrow the land that bred them and bear their legitimate fruit in wide imperial conquests.

Man can no more be scientifically studied apart from the ground which he tills, or the lands over which he travels, or the seas over which he trades, than polar bear or desert cactus can be understood apart from its habitat. Man's relations to his environment are infinitely more numerous and complex than those of the most highly organized plant or animal. So complex are they that they constitute a legitimate and necessary object of special study. The investigation which they receive in anthropology, ethnology, sociology and history is piecemeal and partial, limited as to the race, cultural development, epoch, country or variety of geographic conditions taken into account. Hence all these sciences, together with history so far as history undertakes to explain the causes of events, fail to reach a satisfactory solution of their problems largely because the geographic factor which enters into them all has not been thoroughly analyzed. Man has been so noisy about the way he has "conquered Nature," and Nature has been so silent in her persistent influence over man, that the geographic factor in the equation of human development has been overlooked.

In every problem of history there are two main factors, variously stated as heredity and environment, man and his geographic conditions, the internal forces of race and the external forces of habitat. Now the geographic element in the long history of human develop-

ment has been operating strongly and operating persistently. Herein lies its importance. It is a stable force. It never sleeps. This natural environment, this physical basis of history, is for all intents and purposes immutable in comparison with the other factor in the problem—shifting, plastic, progressive, retrogressive man.

History tends to repeat itself largely owing to this steady, unchanging geographic element. If the ancient Roman consul in far-away Britain often assumed an independence of action and initiative unknown in the provincial governors of Gaul, and if centuries later Roman Catholicism in England maintained a similar independence towards the Holy See, both facts have their cause in the remoteness of Britain from the centre of political or ecclesiastical power in Rome. If the independence of the Roman consul in Britain was duplicated later by the attitude of the Thirteen Colonies towards England, and again within the young Republic by the headstrong self-reliance, impatient of government authority, which characterized the early Trans-Allegheny commonwealths in their aggressive Indian policy, and led them to make war and conclude treaties for the cession of land like sovereign states; and if this attitude of independence in the over-mountain men reappeared in a spirit of political defection looking towards secession from the Union and a new combination with their British neighbour on the Great Lakes or the Spanish beyond the Mississippi, these are all the identical effects of geographical remoteness made yet more remote by barriers of mountain and sea. This is the long reach which weakens the arm of authority, no matter what the race or country or epoch.

As with geographical remoteness, so it is with geographical proximity. The history of the Greek peninsula and the Greek people, because of their location at the threshold of the Orient, has contained a constantly recurring Asiatic element. This comes out most often as a note of warning; like the *motif* of Ortrud in the opera of "Lohengrin," it mingles ominously in every chorus of Hellenic enterprise or pæan of Hellenic victory, and finally swells into a national dirge at the Turkish conquest of the peninsula. It comes out in the legendary history of the Argonautic Expedition and the Trojan War; in the arrival of Phœnician Cadmus and Phrygian Pelops in Grecian lands; in the appearance of Tyrean ships on the coasts of the Peloponnesus, where they gather the purple-yielding murex and kidnap Greek women. It appears more conspicuously in the Asiatic sources of Greek culture; more dramatically in the Persian Wars, in the retreat of Xenophon's Ten Thousand, in Alexander's conquest of Asia, and Hellenic domination of Asiatic trade through Syria to

the Mediterranean. Again in the thirteenth century the lure of the Levantine trade led Venice and Genoa to appropriate certain islands and promontories of Greece as commercial bases nearer to Asia. In 1396 begins the absorption of Greece into the Asiatic empire of the Turks, the long dark eclipse of sunny Hellas, till it issues from the shadow in 1832 with the achievement of Greek independence.

If the factor is not one of geographical location, but a natural barrier, such as a mountain system or a desert, its effect is just as persistent. The upheaved mass of the Carpathians served to divide the westward moving tide of the Slavs into two streams, diverting one into the maritime plain of northern Germany and Poland, the other into the channel of the Danube valley which guided them to the Adriatic and the foot of the Alps. This same range checked the westward advance of the mounted Tartar hordes. The Alps long retarded Roman expansion into central Europe, just as they delayed and obstructed the southward advance of the northern barbarians. Only through the partial breaches in the wall known as passes did the Alps admit small, divided streams of the invaders, like the Cimbri and Teutons, who arrived, therefore, with weakened power and at intervals, so that the Roman forces had time to gather their strength between successive attacks, and thus prolonged the life of the declining empire. So in the Middle Ages, the Alpine barrier facilitated the resistance of Italy to the German emperors, trying to enforce their claim upon this ancient seat of the Holy Roman Empire.

It was by river-worn valleys leading to passes in the ridge that Etruscan trader, Roman legion, barbarian horde, and German army crossed the Alpine ranges. To-day well-made highways and railroads converge upon these valley paths and summit portals, and going is easier; but the Alps still collect their toll, now in added tons of coal consumed by engines and in higher freight rates, instead of the ancient imposts of physical exhaustion paid by pack animal and heavily accoutered soldier. Formerly these mountains barred the weak and timid; to-day they bar the poor, and forbid transit to all merchandise of large bulk and small value which can not pay the heavy transportation charges. Similarly, the wide barrier of the Rockies, prior to the opening of the first overland railroad, excluded all but strong-limbed and strong-hearted pioneers from the fertile valleys of California and Oregon, just as it excludes coal and iron even from the Colorado mines, and checks the free movement of labourers to the fields and factories of California, thereby tightening the grip of the labour unions upon Pacific coast industries.

As the surface of the earth presents obstacles, so it offers channels for the easy movement of humanity, grooves whose direction determines the destination of unknowing, unplanned migrations, and whose termini become, therefore, regions of historical importance. Along these nature-made highways history repeats itself. The maritime plain of Palestine has been an established route of commerce and war from the time of Sennacherib to Napoleon.* The Danube valley has admitted to central Europe a long list of barbarian invaders, covering the period from Attila the Hun to the Turkish besiegers of Vienna in 1683. The history of the Danube valley has been one of warring throngs, of shifting political frontiers, and unassimilated races; but as the river is a great natural highway, every neighbouring state wants to front upon it and strives to secure it as a boundary.

The movements of peoples constantly recur to these old grooves. The unmarked path of the voyageur's canoe, bringing out pelts from Lake Superior to the fur market at Montreal, is followed to-day by whaleback steamers with their cargoes of Manitoba wheat. To-day the Mohawk depression through the northern Appalachians diverts some of Canada's trade from the Great Lakes to the Hudson, just as in the seventeenth century it enabled the Dutch at New Amsterdam and later the English at Albany to tap the fur trade of Canada's frozen forests. Formerly a line of stream and portage, it carries now the Erie Canal and New York Central Railroad.† Similarly the narrow level belt of land extending from the mouth of the Hudson to the eastern elbow of the lower Delaware, defining the outer margin of the rough hill country of northern New Jersey and the inner margin of the smooth coastal plain, has been from savage days such a natural thoroughfare. Here ran the trail of the Lenni-Lenapi Indians; a little later, the old Dutch road between New Amsterdam and the Delaware trading-posts; yet later the King's Highway from New York to Philadelphia. In 1838 it became the route of the Delaware and Raritan Canal, and more recently of the Pennsylvania Railroad between New York and Philadelphia.‡

The early Aryans, in their gradual dispersion over northwestern India reached the Arabian Sea chiefly by a route running southward from the Indus-Ganges divide, between the eastern border of the Rajputana Desert and the western foot of the Aravalli Hills. The

* George Adam Smith, "Historical Geography of the Holy Land," pp. 149-157. New York, 1897.

† A. P. Brigham; "Geographic Influences in American History," Chap. I. Boston, 1903.

‡ R. H. Whitbeck, "Geographic Influences in the Development of New Jersey," *Journal of Geography*, Vol. V, No. 6. January, 1908.

streams flowing down from this range across the thirsty plains unite to form the Luni River, which draws a dead-line to the advance of the desert. Here a smooth and well-watered path brought the early Aryans of India to a fertile coast along the Gulf of Cambay.* In the palmy days of the Mongol Empire during the seventeenth century, and doubtless much earlier, it became an established trade route between the sea and the rich cities of the upper Ganges.† Recently it determined the line of the Rajputana Railroad from the Gulf of Cambay to Delhi.‡ Barygaza, the ancient seaboard terminus of this route, appears in Pliny's time as the most famous emporium of western India, the resort of Greek and Arab merchants.§ It reappears later in history with its name metamorphosed to Baroche or Broach, where in 1616 the British established a factory for trade,|| but is finally superseded, under Portuguese and English rule, by nearby Surat. Thus natural conditions fix the channels in which the stream of humanity most easily moves, determine within certain limits the direction of its flow, the velocity and volume of its current. Every new flood tends to fit itself approximately into the old banks, seeks first these lines of least resistance, and only when it finds them blocked or pre-empted does it turn to more difficult paths.

Geographical environment, through the persistence of its influence, acquires peculiar significance; its effect is not restricted to a given historical event or epoch, but unless met by some strong counteracting force, tends to make itself felt under varying guise in all succeeding history. It is the permanent element in the shifting fate of races. Islands show certain fundamental points of agreement which can be distinguished in the economic, ethnic and historical development of England, Japan, Melanesian Fiji, Polynesian New Zealand, and pre-historic Crete. The great belt of deserts and steppes extending across the Old World gives us a vast territory of rare historical uniformity. From time immemorial they have borne and bred tribes of wandering herdsmen; they have sent out the invading hordes who, in successive waves of conquest, have overwhelmed the neighbouring river lowlands of Eurasia and Africa. They have given birth in turn to Scythians, Indo-Aryans, Avars, Huns, Saracens, Tartars and Turks, as to the Tuareg tribes of the Sahara, the Sudanese and Bantu folk of the African grasslands. But whether

* Hans Helmolt, "History of the World," Vol. II, p. 372. London and New York, 1902-1906.

† Jean Baptiste Tavernier. "Travels in India," 1641-1667. Vol. I, chap. V and map. London, 1889.

‡ Sir Thomas Holdich, "India," p. 305, London, 1905.

§ Bunbury, "History of Ancient Geography," Vol. II, pp. 464-465, 469, London.

|| Imperial Gazetteer for India. Vol. III, p. 109, London, 1885.

these various peoples have been Negroes, Hamites, Semites, Indo-Europeans or Mongolians, they have always been pastoral nomads. The description given by Herodotus of the ancient Scythians is applicable in its main features to the Kirghis and Kalmuck who inhabit the Caspian plains to-day. The environment of this dry grassland operates now to produce the same mode of life and social organization as it did 2400 years ago; stamps the cavalry tribes of Cossacks as it did the mounted Huns, energizes its sons by its dry bracing air, toughens them by its harsh conditions of life, organizes them into a mobilized army, always moving with its pastoral commissariat. Then when population presses too hard upon the meager sources of subsistence, when a summer drought burns the pastures and dries up the water-holes, it sends them forth on a mission of conquest, to seek abundance in the better watered lands of their agricultural neighbours. Again and again the productive valleys of the Hoangho, Indus, Ganges, Tigris and Euphrates, Nile, Volga, Dnieper and Danube have been brought into subjection by the imperious nomads of arid Asia, just as the "hoe-people" of the Niger and upper Nile have so often been conquered by the herdsmen of the African grasslands. Thus, regardless of race or epoch—Hyksos or Kaffir—history tends to repeat itself in these rainless tracts, and involves the better watered districts along their borders when the vast tribal movements extend into these peripheral lands.

The more the comparative method is applied to the study of history—and this includes a comparison not only of different countries, but also of successive epochs in the same country—the more apparent becomes the influence of the soil in which humanity is rooted, the more permanent and necessary is that influence seen to be. Geography's claim to make scientific investigation of the physical conditions of historical events is then vindicated. "Which was there first, Geography or History?" asks Kant. And then comes his answer: "Geography lies at the basis of history." The two are inseparable. History takes for its field of investigation human events in various periods of time; anthropo-geography studies existence in various regions of terrestrial space. But all historical development takes place on the earth's surface, and therefore is more or less molded by its geographic setting. Geography, to reach accurate conclusions, must compare the operation of its factors in different historical periods and at different stages of cultural development. It, therefore, regards history in no small part as a succession of geographical factors embodied in events. Back of Massachusetts' passionate abolition movement, it sees the granitic soil and boulder-

strewn fields of New England; back of the South's long fight for the maintenance of slavery, it sees the rich plantations of tidewater Virginia and the teeming fertility of the Mississippi bottom lands. This is the significance of Herder's saying that "history is geography set into motion." What is to-day a fact of geography becomes tomorrow a factor of history. The two sciences cannot be held apart without doing violence to both, without dismembering what is a natural vital whole. All historical problems ought to be studied geographically and all geographic problems must be studied historically. Every map has its date. Those in the Statistical Atlas of the United States showing the distribution of population from 1790 to 1890 embody a mass of history as well as of geography. A map of France or the Russian Empire has a long historical perspective; and on the other hand, without that map no change of ethnic or political boundary, no modification in routes of communication, no system of frontier defences or of colonization, no scheme of territorial aggrandizement can be understood.

The study of physical environment as a factor in history was unfortunately brought into dispute by extravagant and ill-founded generalizations before it was made the object of investigation according to modern scientific methods. And even to-day principles advanced in the name of anthropo-geography are often superficial, inaccurate, based upon a body of data too limited as to space and time, or couched in terms of unqualified statement which inevitably exposes them to criticism or refutation. Investigators in this field, moreover, are prone to get a squint in their eye that makes them see one geographic factor to the exclusion of the rest; whereas it belongs to the very nature of physical environment to combine a whole group of influences, working all at the same time under the law of the resolution of forces. In this plexus of influences, some operate in one direction and some in another; now one loses its beneficent effect like a medicine long used or a garment outgrown; another waxes in power, reinforced by a new geographic factor which has been released from dormancy by the expansion of the known world, or the progress of invention and of human development.

These complex geographic influences cannot be analyzed and their strength estimated except from the standpoint of evolution. That is one reason these half-baked geographic principles rest heavy on our mental digestion. They have been formulated without reference to the all-important fact that the geographical relations of man, like his social and political organization, are subject to the law of

development. Just as the embryo state found in the primitive Saxon tribe has passed through many phases in attaining the political character of the present British Empire, so every stage in this maturing growth has been accompanied or even preceded by a steady evolution of the geographic relations of the English people.

Owing to the evolution of geographic relations, the physical environment favourable to one stage of development may be adverse to another, and *vice versa*. For instance, a small, isolated and protected habitat, like that of Egypt, Phœnicia, Crete and Greece, encourages the birth and precocious growth of civilization; but later it may cramp progress, and lend the stamp of arrested development to a people who were once the model for all their little world. Open and windswept Russia, lacking these small warm nurseries where Nature could cuddle her children, has bred upon its boundless plains a massive, untutored, homogeneous folk, fed upon the crumbs of culture that have fallen from the richer tables of Europe. But that item of area is a variable quantity in the equation. It changes its character at a higher stage of cultural development. Consequently, when the Muscovite people, instructed by the example of western Europe, shall have grown up intellectually, economically and politically to their big territory, its area will become a great national asset. Russia will come into its own, heir to a long-withheld inheritance. Many of its previous geographic disadvantages will vanish, like the diseases of childhood, while its massive size will dwarf many previous advantages of its European neighbours.

This evolution of geographic relations applies not only to the local environment, but also to the wider world relations of a people. Greeks and Syrians, English and Japanese, take a different rank among the nations of the earth to-day from that held by their ancestors 2,000 years ago, simply because the world relations of civilized peoples have been steadily expanding since those far-back days of Tyrian and Athenian supremacy. The period of maritime discoveries in the fifteenth and sixteenth centuries shifted the foci of the world relations of European states from enclosed seas to the rim of the Atlantic. Venice and Genoa gave way to Cadiz and Lagos, just as, sixteen centuries before, Corinth and Athens had yielded their ascendancy to Rome and Ostia. The keen but circumscribed trade of the Baltic, which gave wealth and historical pre-eminence to Lübeck and the other Hanse Towns of northern Germany from the twelfth to the seventeenth century, lost its relative importance when the Atlantic became the maritime field of history. Maritime leadership passed westward from Lübeck and Stralsund to Amster-

dam and Bristol, as the historical horizon widened. England, prior to this sudden dislocation, lay on the outskirts of civilized Europe, a terminal land, not a focus. The peripheral location which retarded her early development became a source of power when she accumulated sufficient density of population for colonizing enterprises, and when maritime discovery opened a way to trans-oceanic lands.*

Meanwhile, local geographic advantages in the old basins remain the same, although they are dwarfed by the development of relatively greater advantages elsewhere. The broken coastline, limited area and favourable position of Greece make its people to-day a nation of seamen, and enable them to absorb by their considerable merchant fleet a great part of the trade of the eastern Mediterranean,† just as they did in the days of Pericles; but that youthful Aegean world which once constituted so large a part of the *oekumene*, has shrunk to a modest province, and its highways to local paths. The coast cities of northern Germany still maintain a large commerce in the Baltic, but no longer hold the pre-eminence of the old Hanse Towns. The glory of the Venetian Adriatic is gone; but that the sea has still a local significance is proven by the vast sums spent by Austria and Hungary on their hand-made harbours of Trieste and Fiume.‡ The analytical geographer, therefore, while studying a given combination of geographic forces, must be prepared for a momentous readjustment and a new interplay after any marked turning point in the economic, cultural, or world relations of a people.

Skepticism as to the effect of geographic conditions upon human development is apparently justifiable, owing to the multiplicity of the underlying causes and the difficulty of distinguishing between stronger and weaker factors on the one hand, as between permanent and temporary effects on the other. We see the result, but find it difficult to state the equation producing this result. But the important thing is to avoid seizing upon one or two conspicuous geographic elements in the problem and ignoring the rest. The physical environment of a people consists of all the natural conditions to which they have been subjected, not merely a part. Geography admits no single blanket theory. The slow historical development of the Russian folk has been due to many geographic causes—to excess of cold and deficiency of rain, an outskirt location on the

* G. G. Chisholm. "The Relativity of Geographic Advantages," *Scottish Geog. Mag.* Vol. XIII, No. 9, Sept. 1897.

† Hugh Robert Mill, "International Geography," p. 347, New York, 1902.

‡ Joseph Partsch, "Central Europe," pp. 228-230. London, 1903.

Asiatic border of Europe exposed to the attacks of nomadic hordes, a meager and, for the most part, ice-bound coast which was slowly acquired, an undiversified surface, a lack of segregated regions where an infant civilization might be cradled, and a vast area of unfenced plains wherein the national energies spread out thin and dissipated themselves. The superior Baltic and Black Sea coasts, the fertility of its Ukraine soil, and location next to wide-awake Germany along the western frontier have helped to accelerate progress, but the slow-moving body carried too heavy a drag.

The law of the resolutions of forces applies in geography as in the movement of planets. Failure to recognize this fact often enables superficial critics of anthropo-geography to make a brave show of argument. The analysis of these interacting forces and of their various combinations requires careful investigation. Let us consider the interplay of the forces of land and sea apparent in every country with a maritime location. In some cases a small, infertile, niggardly country conspires with a beckoning sea to drive its sons out upon the deep; in others a wide territory with a generous soil keeps its well-fed children at home and silences the call of the sea. In ancient Phœnicia and Greece, in Norway, Finland, New England, in savage Chile and Tierra del Fuego, and the Indian coast district of British Columbia and southern Alaska, a long, broken shoreline, numerous harbours, outlying islands, abundant timber for the construction of ships, difficult communication by land, all tempted the inhabitants to a sea-faring life. While the sea drew, the land drove in the same direction. There a hilly or mountainous interior putting obstacles in the way of landward expansion, sterile slopes, a paucity of level, arable land, an excessive or deficient rainfall withholding from agriculture the rewards of tillage—some or all of these factors combined to compel the inhabitants to seek on the sea the livelihood denied by the land. Here both forces worked in the same direction.

In England conditions were much the same, and from the sixteenth century produced there a predominant maritime development which was due not solely to a long indented coastline and an exceptional location for participating in European and American trade. Its limited island area, its large extent of rugged hills and chalky soil fit only for pasturage, and the lack of a really generous natural endowment,* made it slow to answer the demands of a growing population, till the industrial development of the nineteenth century exploited its mineral wealth. So the English turned to the sea—

* H. J. Mackinder, "Britain and the British Seas," pp. 317-323. London, 1904.

to fish, to trade, to colonize. Holland's conditions made for the same development. She united advantages of coastline and position with a small infertile territory, consisting chiefly of water-soaked grazing lands. When at the zenith of her maritime development, a native authority estimated that the soil of Holland could not support more than one-eighth of her inhabitants. The meager products of the land had to be eked out by the harvest of the sea. Fish assumed an important place in the diet of the Dutch, and when a process of curing it was discovered, laid the foundation of Holland's export trade. A geographical location central to the Baltic and North Sea countries, and accessible to France and Portugal, combined with a position at the mouth of the great German rivers made it absorb the carrying trade of northern Europe.* Land and sea coöperated in its maritime development.

Often the forces of land and sea are directly opposed. If a country's geographic conditions are favourable to agriculture and offer room for growth of population, the land forces prevail, because man is primarily a terrestrial animal. Such a country illustrates what Chisholm, with Attic nicety of speech, calls "the influence of bread-power on history,"† as opposed to Mahan's sea-power. France, like England, had a long coastline, abundant harbours, and an excellent location for maritime supremacy and colonial expansion; but her larger area and greater amount of fertile soil put off the hour of a redundant population such as England suffered from even in Henry VIII's time. Moreover, in consequence of steady continental expansion from the twelfth to the eighteenth century and a political unification which made its area more effective for the support of the people, the French of Richelieu's time, except those from certain districts, took to the sea, not by national impulse as did the English and Dutch, but rather under the spur of government initiative. They therefore achieved far less in maritime trade and colonization.‡ In ancient Palestine, a long stretch of coast, poorly equipped with harbours, but accessible to the rich Mediterranean trade, failed to offset the attraction of the gardens and orchards of the Jordan valley and the pastures of the Judean hills, or to overcome the land-born predilections and aptitudes of the desert-bred Jews. Similarly, the river-fringed peninsulas of Virginia and Maryland, opening wide their doors to the incoming sea, were powerless, nevertheless, to draw the settlers away from the riotous productiveness of the

* Capt. A. T. Mahan, "Influence of Sea Power upon History," pp. 36-38. Boston, 1902.

† G. G. Chisholm, "Economic Geography," *Scottish Geog. Mag.*, March, 1908.

‡ Capt. A. T. Mahan, "Influence of Sea Power upon History," pp. 37-38. Boston, 1902.

wide tidewater plains. Here again the geographic force of the land outweighed that of the sea and became the dominant factor in directing the activities of the inhabitants.

The two antagonistic geographic forces may be both of the land, one born of a country's topography, the other of its location. Switzerland's history has for centuries shown the conflict of two political policies, one a policy of cantonal and communal independence, which has sprung from the division of that mountainous country into segregated districts, and the other one of political centralization, dictated by the necessity for co-operation to meet the dangers of Switzerland's central location mid a circle of larger and stronger neighbours. Local geographic conditions within the Swiss territory fixed the national ideal as a league of "sovereign cantons," to use the term of their constitution, enjoying a maximum of individual rights and privileges, and tolerating a minimum of interference from the central authority. Here was physical dismemberment coupled with mutual political repulsion. But a location at the meeting place of French, German, Austrian and Italian frontiers laid upon them the distasteful necessity of union within to withstand the aggressions crowding on them from without. Hence the growth of the Swiss constitution since 1798 has meant a fight of the Confederation against the canton in behalf of general rights, expanding the functions of the central government, contracting those of canton and commune.*

The geographic factors in history appear now as conspicuous direct effects of environment, such as the forest warfare of the American Indian or the irrigation works of the Pueblo tribes, now as a group of indirect effects, operating through the economic, social and political activities of a people. These remoter secondary results are often of supreme importance; they are the ones which give the final stamp to the national temperament and character, and yet in them the causal connection between environment and development is far from obvious. They have, therefore, presented pitfalls to the precipitate theorizer. He has either interpreted them as the direct effect of some geographic cause from which they were wholly divorced and thus arrived at conclusions which further investigation failed to sustain; or seeing no direct and obvious connection, he has denied the possibility of a generalization.

Montesquieu ascribes the immutability of religion, manners, customs and laws in India and other oriental countries to their warm

* Boyd Winchester, "The Swiss Republic," pp. 123, 124, 145-147. Philadelphia, 1891.

climate.* Buckle attributes a highly wrought imagination and gross superstition to all people, like those of India, living in the presence of great mountains and vast plains, knowing Nature only in its overpowering aspects, which excite the fancy and paralyze reason. He finds, on the other hand, an early predominance of reason in the inhabitants of a country like ancient Greece, where natural features are on a smaller scale, more comprehensible, nearer the measure of man himself.† The scientific geographer, grown suspicious of the omnipotence of climate and cautious of predicating immediate psychological effects which are easy to assert but difficult to prove, approaches the problem more indirectly and reaches a different solution. He finds that geographic conditions have condemned India to isolation. On the land side, a great sweep of high mountains has restricted intercourse with the interior; on the sea side, the deltaic swamps of the Indus and Ganges Rivers and an unbroken shoreline, backed by mountains on the west of the peninsula and by coastal marshes and lagoons on the east, have combined to reduce its accessibility from the ocean. The effect of such isolation is ignorance, superstition, and the early crystallization of thought and customs. Ignorance involves the lack of material for comparison, hence a restriction of the higher reasoning processes, and an unscientific attitude of mind which gives imagination free play. In contrast, the accessibility of Greece and its focal location in the ancient world made it an intellectual clearing-house for the eastern Mediterranean. The general information gathered there afforded material for wide comparison. It fed the brilliant reason of the Athenian philosopher and the trained imagination which produced the masterpieces of Greek art and literature.

Heinrich von Treitschke, in his recent "Politik," imitates the direct inference of Buckle when he ascribes the absence of artistic and poetic development in Switzerland and the Alpine lands to the overwhelming aspect of nature there, its majestic sublimity which paralyzes the mind.‡ He reinforces his position by the fact that, by contrast, the lower mountains and hill country of Swabia, Franconia and Thuringia, where nature is gentler, stimulating, appealing, and not overpowering, have produced many poets and artists. The facts are incontestable. They reappear in France in the geographical distribution of the awards made by the Paris *Salon* of 1896. Judging by these awards, the rough highlands of Savoy, Alpine Province,

* Montesquieu, "Spirit of the Laws," Book XIV, chap. IV.

† Henry Buckle, "History of Civilization in England," Vol. I, pp. 86-106.

‡ Heinrich von Treitschke, "Politik," vol. I, p. 225, Leipzig, 1897. This whole chapter on *Land und Leute* is suggestive.

the massive eastern Pyrenees, and the Auvergne plateau, together with the barren peninsula of Brittany, are singularly lacking in artistic instinct, while art flourishes in all the river lowlands of France. Moreover, Frenchmen of letters, by the distribution of their birthplaces, are essentially products of fluvial valleys, and plains, rarely of upland and mountain.*

This contrast has been ascribed to a fundamental ethnic distinction between the Teutonic population of the lowlands and the Alpine or Celtic stock which survives in the protected isolation of highland and peninsula, thus making talent an attribute of race. But the Po valley of northern Italy, whose population contains a strong infusion of this supposedly stultifying Alpine blood, and the neighbouring lowlands and hill country of Tuscany show an enormous preponderance of intellectual and artistic power over the highlands of the peninsula.† Hence the same contrast appears among different races under like geographic conditions. Moreover, in France, other social phenomena, such as suicide, divorce, decreasing birth-rate, and radicalism in politics, show this same startling parallelism of geographic distribution.‡ and these cannot be attributed to the stimulating or depressing effect of natural scenery on the human mind.

Mountain regions discourage the budding of genius because they are areas of isolation, confinement, remote from the great currents of men and ideas that move along the river valleys. They are regions of much labour and little leisure, of poverty to-day and anxiety for the morrow, of toil-cramped hands and toil-dulled brains. In the fertile alluvial plains are wealth, leisure, contact with many minds, large urban centers where commodities and ideas are exchanged. The two contrasted environments produce directly certain economic and social results, which, in turn, become the causes of secondary intellectual and artistic effects. The low mountains of central Germany which von Treitschke cites as homes of poets and artists, owing to abundant and varied mineral wealth, are the seats of active industries and dense populations,§ while their low reliefs present no serious obstacle to the numerous highways across them. They, therefore, afford all conditions for culture.

Let us take a different example. The rapid modification in physical and mental constitution of the English transplanted to North America, South Africa, Australia and New Zealand has been

* W. L. Ripley, "Races of Europe," pp. 524-525. New York, 1899.

† *Ibid.*, 526.

‡ *Ibid.*, 517-520, 533-736.

§ Joseph Partsch, "Central Europe," pp. 256-257, 268-271. London, 1903.

the result of several geographic causes working through the economic and social media; but it has been ascribed by Darwin and others to the effect of climate. The prevailing energy and initiative of colonists have been explained by the stimulating atmosphere of their new homes. Even Natal has not escaped this soft impeachment. But the enterprise of colonials has cropped out under almost every condition of heat and cold, aridity and humidity, of a habitat at sea-level and on high plateau. This blanket theory of climate cannot, therefore, cover the case. Careful analysis supersedes it by a whole group of geographic factors working directly and indirectly. The first of these was the dividing ocean, which prior to the introduction of cheap ocean transportation and bustling steerage agents, made a basis of artificial selection. Then it was the man of abundant energy who, cramped by the narrow environment of a Norwegian farm or Irish bog, came over to America to take up a quarter-section of prairie land or rise to the eminence of Boston police sergeant. The Scotch immigrants in America who fought in the Civil War were nearly two inches taller than the average in the home country.* But the ocean barrier culled superior qualities of mind and character also—independence of political and religious conviction, and the courage of those convictions, whether found in royalist or Puritan, Huguenot or English Catholic.

Such colonists in a remote country were necessarily few and could not be readily reinforced from home. Their new and isolated geographical environment favoured variation. Heredity passed on the characteristics of a small, highly selected group. The race was kept pure from intermixture with the aborigines of the country, owing to the social and cultural abyss which separated them, and to the steady withdrawal of the natives before the advance of the whites. The homogeneity of island peoples seems to indicate that individual variations are in time communicated by heredity to a whole population under conditions of isolation; and in this way modifications due to artificial selection and a changed environment become widely spread.

Nor is this all. The modified type soon becomes established, because the abundance of land at the disposal of the colonists and the consequent better conditions of living encourage a rapid increase of population. A second geographic factor of mere area here begins to operate. Ease in gaining subsistence, the greater independence of the individual and the family, emancipation from carking care, the hopeful attitude of mind engendered by the consciousness of an

* W. L. Ripley, "Races of Europe," p. 89. New York, 1899.

almost unlimited opportunity and capacity for expansion, the expectation of large returns upon labour, and, finally, the profound influence of this hopefulness upon the national character, all combined, produce a social rejuvenation of the race. New conditions present new problems which call for prompt and original solution, make a demand upon the ingenuity and resourcefulness of the individual, and therefore work to the same end as his previous removal from the paralyzing effect of custom in the old home country. Activity is youth and sluggishness or paralysis is age. Hence the energy, initiative, adaptibility, and receptivity to new ideas—all youthful qualities—which characterize the Anglo-Saxon American as well as the English Africander, can be traced back to the stimulating influences, not of a bracing or variable climate, but of the abundant opportunities offered by a great, rich, unexploited country. Variation under new natural conditions, when safe-guarded by isolation, tends to produce modification of the colonial type; this is the direct effect of a changed environment. But the new economic and social activities of a transplanted people become the vehicle of a mass of indirect geographic influences which contribute most to the differentiation of the national character.

The tendency to overlook such links between conspicuous effects and their remote, less evident geographic causes has been common in geographic investigation. This direct rather than indirect approach to the heart of the problem has led to false inferences or to the assumption that reliable conclusions were impossible. Environment influences the higher, mental life of a people chiefly through the medium of their economic and social life; hence its ultimate effects should be traced through the latter back to the underlying cause. But rarely is this done. Even so astute a geographer as Strabo, though he recognizes the influence of geographic isolation in differentiating dialects and customs in Greece,* ascribes some national characteristic to the nature of the country, especially to its climate, and the others to education and institutions. He thinks that the nature of their respective lands had nothing to do with making the Athenians cultured, the Spartans and Thebans ignorant; that the predilection for natural philosophy in Babylonia and Egypt was not a result of environment but of the institutions and education of those countries.† But here arise the questions, how far custom and education in their turn depend upon environment; to what degree natural conditions, molding economic and political development, may through them fundamentally affect social customs,

* Strabo, Book VII, chap I, p. 2.

† Strabo, Book II, chap. III, p. 7.

education, culture, and the dominant intellectual aptitudes of a people. It is not difficult to see, back of the astronomy and mathematics and hydraulics of Egypt, the far off sweep of the rain-laden monsoons against the mountains of Abyssinia and the creeping of the tawny Nile flood over that river-born oasis.

Plutarch states in his "Solon" that after the rebellion of Kylon in 612 B.C. the Athenian people were divided into as many political factions as there were physical types of country in Attica. The mountaineers, who were the poorest party, wanted something like a democracy; the people of the plains, comprising the greatest number of rich families, were clamorous for an oligarchy; the coast population of the south, intermediate both in social position and wealth, wanted something between the two. The same three-fold division appeared again in 564 B.C. on the usurpation of Peisistratus.* Here the connection between geographic condition and political opinion is clear enough, though the links are agriculture and commerce. New England's opposition to the War of 1812, culminating in the threat of secession of the Hartford Convention, can be traced back through the active maritime trade to the broken coastline and unproductive soil of that glaciated country.

In all democratic or representative forms of government permitting free expression of popular opinion, history shows that division into political parties tends to follow geographical lines of cleavage. In our own Civil War the dividing line between North and South did not always run east and west. The mountain area of the Southern Appalachians supported the Union and drove a wedge of disaffection into the heart of the South. Mountainous West Virginia was politically opposed to the tidewater plains of old Virginia, because slave labour did not pay on the barren "upright" farms of the Cumberland Plateau; whereas, it was remunerative on the wide fertile plantations of the coastal lowland. The ethics of the question were obscured where conditions of soil and topography made the institution profitable. In the mountains, as also in New England, a law of diminishing financial returns had for its corollary a law of increasing moral insight. In this case, geographic conditions worked through the medium of direct economic effects to more important political and ethical results.

The roots of geographic influence often run far underground before coming to the surface, to sprout into some flowering growth; and to trace this back to its parent stem is the necessary but not easy task of the geographer.

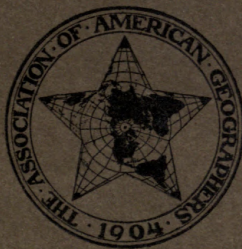
* Plutarch, "Solon," pp. 13, 29, 154.



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The Barrier Boundary of the Mediterranean Basin and Its Northern Breaches as Factors in History

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THE BARRIER BOUNDARY OF THE MEDITERRANEAN BASIN AND ITS NORTHERN BREACHES AS FACTORS IN HISTORY

ELLEN CHURCHILL SEMPLE

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INTRODUCTION.—The Mediterranean occupies the subsidence areas in the broad belt of young, folded mountains which cross Southern Europe and the neighboring parts of Africa and Asia. Moreover, it lies on the northern margin of the trade-wind tract. These two features of its geographical location are of immense import. They have given to the Mediterranean Basin the isolating boundaries of mountains and deserts. They have made it in a peculiar sense an inclosed sea. It is inclosed, not only by the land, but by barrier forms of the land. Rarely are the barriers single, moreover. Range succeeds range to a snow-capped climax of the land: beyond mountain system or precipitous escarpment lies semi-arid waste, far-stretching desert, or rugged plateau.

These barrier boundaries long exercised a dominant influence upon Mediterranean history. For ages they confined that history within the narrow limits of the basin, except where a few natural openings offered pathways to regions of contrasted climate and production beyond. These breaches in the barrier were varied in their geographical character—a river road like the Nile across the desert, a strait like Gibraltar, an isthmus like Suez, a long intermontane trough like the Rhone Valley, or a saddle in the encircling mountains like the Peartree Pass and the low Karst Plateau. But all have focused upon themselves the historical events of wide areas. They have crowded into their narrow channels streams of trade, migration, colonization, and conquest; they have drawn these from remote sources and directed them to equally remote destinations. They have played this rôle of the guiding hand of Providence from the dawn of history to the World War of 1915.

The Mediterranean is inclosed on the north by a mountain rampart, measuring 2,330 miles in a straight line from the folded ranges behind Gibraltar to the massive Taurus System, where it looms above the Bay of Alexandretta. The huge oblong of the Anatolian Plateau, lying at an

average elevation of 3,000 to 4,000 feet (1,000 to 1,200 meters), bordered north and south by yet higher ranges rising abruptly from the sea, and edged by a rugged, inhospitable coast, lends to the Asia Minor Peninsula the character of a triple barrier confining the Levantine Basin of the Mediterranean on the north for a distance of 560 miles (900 kilometers). Its rigid billows of land, mounting higher and higher from west to east, merge into other highlands extending far into Asia. Any attempt, therefore, to round them on the east involves a toilsome journey over the ranges of Armenia, whose valley floors to be traversed lie nearly 6,000 feet (1,800 meters) above sea-level.

THE BOSPORUS-HELLESPONT BREACH.—On the west, this barrier peninsula sinks beneath the Ægean Sea; but its folded ranges, lifting their peaks above the waves as rocky islands, soon emerge again in the broad, corrugated highlands of the Balkan Peninsula. The blunt northwest corner of Asia Minor dips so slightly that the Bosphorus and Hellespont make only a wet scratch across its surface. But that scratch is enough. It forms a clear breach in the inclosing mountain wall. Through it the Mediterranean penetrates into the Euxine Basin, but only to face other mountain obstructions encircling this great marine alcove on all but its northwest coast. The extensive subsidence between the lower Danube plain and the Crimea breaks the continuity of the folded barrier between the Balkans and the Caucasus System. The Caucasus, also, is nipped in two by the Kertch Strait, which severs the Yaila Mountains of the Crimea from the parent range, and admits the Euxine waters into the Sea of Azof. This local depression is a companion piece to the Gulf of Odessa. Only in these two inlets of shallow water does the Mediterranean penetrate beyond its normal mountain boundaries into the low, accessible plains of Eastern Europe.

Where the north wall opens its gates at the Bosphorus and Hellespont, the Mediterranean reached out and drew these coastal plains of Russia into its field of history from the seventh century before Christ till the control of the Straits passed to the intruding Turks in 1453. The elements of this history were in general peaceful: commerce and colonization. Greek trading-stations and colonies at an early date began to line the Pontic shores,¹ and to send out lumber from the well-forested Caucasus, summer wheat from the Crimean plains, hides from steppe pastures, and fish from the tunny spawning-grounds.² Ancient Athens, poor in plowland, came to depend chiefly upon Pontic wheat to supply her market,³ and the Scythian tribes of the Dnieper grassland came equally to depend upon Greek wine as the luxury of their meager fare. These are the chief

¹ Bury, J. B.: *History of Greece* (New York, 1909), 90-93.

² Strabo xi. 2, 4.

³ Herodotus iv. 17; vii. 147. Demosthenes *De Corona* par. 73, 87. Wiskermann, H.: *Die Antike Landwirtschaft Preisschrift* (Leipzig, 1859), 14-20. Xenophon *Hellenes* v. 4. 61. Diodorus Siculus xv. 34. Bury, J. B.: *op. cit.*, 196, 379, 615, 616. Curtius, Ernst: *History of Greece* (tr. by A. W. Ward, New York, 1899), V, Book VII, 137.

exchanges today between the two localities. With every threat of interruption to communication through the Bosphorus and Hellespont the price of wheat went up in Attica and Miletus, till finally Athens drew all the coastal fringe of Pontic cities and the Straits themselves into her maritime empire, and guaranteed the security of her grain trade by an unrivaled navy.¹

By reason of this marine breach in the mountain barrier the Greeks were able to weave a border of Hellenic blood and culture upon those northern Euxine shores. Owing to the successive streams of nomad hordes from Western Asia which flooded the adjoining plains, however, Mediterranean civilization left there no permanent impress. Nevertheless, Russian traders and marauders from northern Slav principalities like Kiev, Smolensk, and commercial Novgorod, took the Dnieper River route to the Black Sea and Constantinople in the ninth and tenth centuries, and carried away the elements of Byzantine art and religion to the untutored north.

THE BALKAN BARRIERS AND THE MORAVA-VARDAR FURROW.—West of the Bosphorus and Hellespont the border barriers of the Mediterranean reappear, faintly at first, as the worn-down hill country of eastern Thrace. This affords an easy land road through the Maritza Valley between the Ægean and the Black Sea, and thus reinforces the marine communication through the near-by straits. The Thracian hills, however, soon rise and merge into the broad, compound barrier formed by the steep Balkan folds and the ancient crystalline mass of the Thraco-Macedonian Highlands. This old dissected mountain region, rising to heights of 9,000 feet or more in the Rhodope and Perim ranges, but sinking elsewhere to broad, undulating uplands and deep river valleys, serves to cement the young Balkan System to the multiple ranges of the Dinaric Alps. These run north and south through the western part of the Peninsula, from the head of the Adriatic to the rocky headlands of the Peloponnesus, in a forbidding succession of bold limestone ridges, which rise to jagged crests 6,500 feet (2,000 meters) above the sea. Communication between the Adriatic coast and the interior is excessively difficult. No thoroughfare is offered by the rivers Narenta and Drin, which break through the ranges in wild, impassable gorges. Travel across the country is a succession of ups and downs over gray, stony ridges and gray, barren valleys, for rarely does a saddle nick the high sky-line of the chains. Width, height, and lack of passes make the Dinaric System maintain in a pre-eminent degree the barrier nature of mountains.²

In all the 700-mile stretch of mountains between the Maritza Valley and the Gulf of Trieste there is no real breach, but only a few passes which are approached by long, often devious, routes across the highlands. The Morava and Vardar rivers, the one flowing north and the other south

¹ Bury, J. B.: *op. cit.*, 365, 380-81.

² Based upon personal observation during a motor trip through Dalmatia, Bosnia, Herzegovina, and Montenegro in 1912.

from a low watershed (460 meters or 1,508 feet) in the heart of the Peninsula, together cut a valley furrow of gentle slopes across the mountains from the Danube near Belgrade to the northwest corner of the Ægean Sea. This furrow has from ancient times determined the north-and-south line of communication. The land route which it opens is easy but long, because it crosses a mountain mass over 300 miles wide. Moreover, travel on it is not assisted by river transportation. The Vardar, choked by sand in its passage across its swampy, deltaic plain to the Gulf of Salonica, and broken by rapids in its upper course, affords no water-way to the interior, while the Morava is navigable for only seventy miles from the Danube.¹

The mountains about the head of the Vardar, inhabited by robber tribes from remote times, served to discourage Macedonia's expansion northward, even under Philip and Alexander the Great. Roman dominion did not overstep this barrier till 29 B.C., or a hundred and fifteen years after the conquest of Macedonia, when the Morava Valley, under the title of Upper Moesia, was embodied in the Empire. Even then the mountain watershed remained the provincial boundary, and was never crossed by a Roman road between the two valleys.

The great Roman highway of the Peninsula ran between the capital at Constantinople and the middle Danubian frontier—between the military center and the exposed border. It left the Morava Valley at Naissus (modern Nish) and followed a diagonal furrow across the high valleys between the Balkan and Anti-Balkan mountains through Serdica (Sofia), and then by the Trajan Pass (843 meters, or 2,765 feet) reached the upper Maritza Valley. Thence it led past Philippopolis and Adrianople to Constantinople. This route took a long and devious course to avoid the great highland mass of the Peninsula, and thereby became the historic highway from Central Europe to the Byzantine bridge and Asia Minor; it was essentially a land route from west to east, rather than a transit route across the mountains from north to south.

This rôle fell to the Morava-Vardar groove, and was a later development so far as historical record goes; but doubtless it played its part in the prehistoric drift of the Greek peoples from the northwest southward into Macedonia, Thessaly, and Hellas. This was the route traversed by the Ostrogoths in 473 A.D. in their invasion of Northern Greece.² It was the line of expansion of the Servian kingdom under the great Stephan Dusan (1336-56), whose inland domain needed an outlet on the Ægean;³ and also the line of expansion with the same objective in the Gulf of Salonica, that was the aim of Serbia in the Balkan War of 1912.

¹ Hogarth, D. G.: *The Nearer East* (London, 1905), 23, 24, 238.

² Hodgkin, Thomas: *Italy and Her Invaders* (Oxford, 1880), III, Book IV, note, p. 31 and map, p. 32.

³ Miller, William: *The Balkans* (New York, 1907), 273.

Servia's location in the Morava Basin has made it custodian of these main routes south and east across the Balkan Peninsula. It blocks the path between east and west. For this reason the Turkish sultans of the fifteenth century saw that they must first occupy Servia, if they were to realize their purpose of conquering the rich fields of Hungary; and Hungary rushed to the support of Servia when the Turkish onslaught came, in order to guard the avenue leading to its own frontier. The Turks secured the control of Servia. They found its thoroughfare so necessary to them in their long wars with Hungary, that they kept a tighter grip upon Servia than upon Moldavia and Wallachia, and immediately upon its conquest in 1459 made it an integral part of their empire.¹

From the early eighteenth century, when the Turks began their slow recession in the Balkan Peninsula and the Austrian power its advance, the country holding the Morava highway was again the bone of contention. Between 1718 and 1739 Austria drove a wedge of occupation up the Morava Basin nearly to Nish. From the time of Emperor Joseph II (d. 1790) the domination of Servia has been a fundamental principle of Austrian statesmanship. The object has been twofold: to guard this open highway which gives access to the middle Danube from two directions; and to gain for the vast inland empire of Austro-Hungary an outlet to the Ægean and to the Bosphorus, the sea breach in the mountain barrier which commands both the Black Sea trade and the land route through Asia Minor to the east.

Russia, also, since it secured its first Black Sea littoral in 1783, has made the Bosphorus the objective of its expansion. It needs an outlet to the Mediterranean that cannot be jeopardized. During the closure of the Dardanelles against Italian aggression in the spring of 1912, Greek, Norwegian, and British grain ships were penned up in the harbor of Odessa, while European cities clamored for Russian wheat. More ominous for the fate of Russia in the present conflict is the exclusion of munitions from the Black Sea ports, and her inability to market the wheat which would re-establish her national credit. Her present necessity furnishes the strongest argument for final perseverance in her aim.

PASSES OF THE JULIAN ALPS AND THE KARST.—Austria's need for a southern outlet is not so urgent. She commands another breach in the barrier boundary of the Mediterranean. Near her Italian frontier at the head of the Adriatic, the broad and corrugated highlands bordering the western side of the Balkan Peninsula contract and dip as they merge into the Karst Plateau and the Julian Alps. Farther north again towers the mighty system of the Alps, rising range beyond range, up to the high, white levels of eternal snow. The Julian Alps are a slender southeastern offshoot of the main system. They attain in the north an altitude of 9,394 feet (2,864 meters) in the three-cornered peak of Terglon, but from this they shelve off southward into a rugged limestone platform of low altitude.

¹ Miller, William: *The Balkans*, 293.

Presenting toward the west a steep and forbidding escarpment, crossed by narrow ridges, pock-marked by numerous funnel-shaped cavities, and guiltless of visible drainage streams, this Karst Plateau extends along the base of the Istrian Peninsula as far as the Gulf of Fiume and the eastward-flowing Kulpa River. It merges beyond into the high, folded ranges of the Great Capella Mountains, which effectively cut off their hinterland from the sea.

Northeast of the Adriatic, therefore, for a stretch of 46 miles (75 kilometers), the mountain barrier of the Mediterranean Basin is partially breached. At one point it narrows to the width of 30 miles (50 kilometers) between the low Venetian plains and the deep re-entrant valley of erosion cut back into the highland mass by the upper Save River and its headstreams. Moreover, at this narrowest point the barrier sinks to the level of 2,897 feet in a limestone plateau known to the ancients as the Mons Oera, and to moderns as the Peartree Range. Two rivers, the Frigidus or Wipbach on the western slope, and the Laibach on the eastern, issue from limestone caverns, after the manner of streams in the Karst country, and carve out paths down the opposite sides from the low plateau above to the plains below. Here, therefore, the Alpine barrier *et largius patentem et planissimum habet ingressum*, says the historian Paulus (720–800 A.D.), who from his boyhood had known this broad and easy entrance, and had seen a barbarian horde burst through it as through an open door.¹

There were other routes across the mountain saddle, as we shall see, but this was the best, and from very ancient times it became a well-trodden path. Here concentrated the traffic of a far-reaching hinterland. The geographical reasons are plain enough. The Peartree Pass afforded the shortest and lowest transit route to the interior in the whole 1,300-mile stretch of mountains between the Bosphorus and the Rhone Valley breach. It lay between two natural thoroughfares, the level plains of Northern Italy and the wide plain of the Danube, which cannot be separated geographically or historically from the nomad-breeding steppes of Southern Russia. The Drave and Save rivers, tributaries of the Danube, drain the longitudinal valleys of the eastern Alps and open avenues of easy grade far up the eastern slope of the dividing range. Moreover, this dip in the mountain wall was located between the head of the Adriatic, an old sea-lane of maritime enterprise, and the head of navigation on the Laibach-Save-Danube System. For the little Laibach can carry a barge soon after it issues from its cavern. It springs full grown from the mountain's womb, such strength has it gathered in its underground life, fed by a whole arterial system of hidden rivers.

The historical importance of passes increases with their facility of transit; with their command of valley thoroughfares and water approaches, either navigable rivers or seas; and with the contrast between the regions of productions, both in point of climate and of industrial development,

¹ Quoted in T. Hodgkin, *op. cit.*, V, Book VI, note, p. 160.

which such passes serve to unite and whose trade they forward.¹ All four of these advantages were possessed by the Peartree Pass in a high degree. Its claim to the first two has been indicated. Through all ancient and mediaeval times it connected the civilized and industrial Mediterranean lands with a vast hinterland of barbarism, with shifting tribes of nomadic herdsmen and semi-nomadic agriculturalists. It facilitated the exchange of artistic manufactured products in bronze, pottery, linen and woolen fabric for the crudest raw materials from forest, pasture, and mine.

The contrast in climate is almost as marked. The Julian Alps and Karst Plateau are a heat divide. On their slopes the warm, temperate climate of the Mediterranean Basin meets the cold temperate climate of Central Europe. The January isotherm of 0 degree C. (32 degrees F.), which marks the dividing line, nowhere else approaches so near to the Mediterranean proper as here. It runs through Bremen, Munich, along the watershed of the Karst, then turns southeast into the heart of the Balkan Peninsula. A similar contrast of winter temperatures in an equally short space appears on the opposite side of the Caucasus windshield, along the Black Sea littoral. The Peartree Pass, which is located approximately on the forty-sixth parallel of latitude, looks down upon the olive trees and rice fields of the warm Venetian plains. Here Italy revealed her fatal gift of beauty to the barbarian hordes who pushed up the Danube highroad to the half-open gate of the Hesperian Garden.

The ancient Mons Oera route left the Adriatic at Aquileia, a Roman river port located four miles up the navigable Aquilo, accessible to the sea but somewhat protected from the chronic piracy of the Adriatic. Turning eastward, the road crossed the Sontius (modern Isonzo) and led up the fertile valley of the Frigidus (Wipbach) to the summit of the Mons Oera plateau. There the easiest path across must have run past a wild pear tree, whose white blossoms made a conspicuous landmark against the green of the surrounding forest when spring reopened traffic on the road. At any rate, the Roman roadmakers called the station at the summit Ad Pirum. This name survives in the Peartree Pass and the Birnbaumer Wald, the German name of the old Mons Oera plateau. From the summit (2,897 feet) the road dropped down to Nauportus (modern Ober-Laibach, at 970 feet) on the Laibach River, where navigation began on the Save-Danube System. Strabo states that the distance between Aquileia and Nauportus was variously estimated from 350 to 500 stadia, or 40 to 57 miles.²

The Romans knew of another track over the Mons Oera Range, leading up from Tergeste (Trieste) to Lacus Lugeum (Lake Zirknitz), and thence to Nauportus.³ This route had marked disadvantages. It ascended the

¹ Semple, E. C.: *Influences of Geographic Environment* (New York, 1911), 546, 549.

² Strabo iv. 6. 10; vii. 5. 2. For the modern road in detail, see Kröhn, Walter: *Beiträge zur Verkehrs-geographie von Krain* (Königsberg, 1911), 61-62.

³ Mommsen: *History of Rome* (New York, 1873), III, 215. For the modern road, see *ibid.*, 63. Canstein, P. von: *Die öestlichen Alpen* (Berlin, 1837), 235-58.

plateau by no long valley of approach like that of the Frigidus, but mounted the steep escarpment overhanging the Gulf of Trieste. Though it may have found a lower gap than the Peartree Pass, it had to traverse the plateau at its greatest width and therefore to cross the successive hill ranges that corrugate its surface. Moreover, the plateau is almost devoid of water, which everywhere seeps through the porous limestone to some impervious stratum of clay or sandstone. None remains on the surface to carve out a river valley of easy travel for the wayfarer. Therefore this route seems early to have been abandoned in favor of the Peartree Pass. Centuries later it was partially revived when Aquileia and the other ports along the low Venetian coast were silted up by the deposits of muddy Alpine torrents, and were therefore superseded by the deep mountain-rimmed harbor of Trieste. This harbor was the geographical determinant which made the modern railroad follow the plateau route and grapple with the problem of mounting its bold escarpment.

This second Mons Oera route lacked early historical importance also because it did not debouch upon the fertile Venetian plains. It was therefore generally neglected by invading hordes from the Danube, whose objective was the rich cities of Cisalpine Gaul. The barbarians preferred as alternatives two routes to the north of the Julian Alps. These were approached by the valley highways of the upper Drave and Save rivers, and crossed the mountains by a high saddle between the Julian and Carnic Alps. The eastern starting-point for both was the ancient Santicum (modern Villach), located at an altitude of 1,665 feet, in a broad and lake-strewn basin at the head of navigation on the Drave. It had a situation similar to that of Nauportus. From this point one track led south over the Col di Tarvis and the difficult Predil Pass, called the "Thermopylae of Carinthia" (3,810 feet or 1,162 meters), to the head of the Sontius Valley (Isonzo), which opened a way down to the coast near Aquileia.¹ The Predil Pass was too difficult to attract a military road in ancient times, though it was the route of the invading Lombards in 568 A.D. A few miles to the west of it, through the Pontebba or Pontafel Pass (2,615 feet or 797 meters), ran the other route from the Col di Tarvis, which connected on the Italian slope with a headstream of the Tiliaventus River (Tagliamento). In the days of the Empire a Roman military road followed this route over the Alps, and connected Aquileia with the navigable course of the Drave,² but for the trader it involved a long detour from his market.

The ancient amber route from the Baltic, one of the earliest trade routes of Europe, doubtless reached the Mediterranean by all these passes, especially in its primitive stages, when it was trying all the paths to find the easiest. This is the evolutionary history of all the pioneer roads. The amber route started from the famous amber fields of the southeastern

¹ For modern road, see Baedeker: *The Eastern Alps* (Leipzig, 1888), 441-42. Krebs, Norbert: *Länderkunde der österreichischen Alpen* (Stuttgart, 1913), 401, 409.

² Shepherd, W. R.: *Historical Atlas* (New York, 1911), map, p. 27.

Baltic, especially those of the Samland, and led up the Vistula or Oder River to the Moravian Gate, a broad geological gap between the Carpathian and Sudetes mountains, which was once a passage of the Eocene Sea. The route led thence down the March River to the Danube, thence across the spreading spurs of the eastern Alps to the Save Valley, the shrunk barrier of the Julian Alps, and the Mons Odra Pass.¹ According to Pliny, amber was brought by the Germans to Pannonia (Carinthia and Carniola), and purchased from them by the Veneti living on the north Adriatic coast. He mentions the amber necklaces worn by the women of this region, not only as an ornament, but as a protection against sore throat.²

So regularly did the Baltic amber emerge here upon the horizon of Mediterranean commerce that the myth of Phaeton's sisters, transformed into poplar trees and weeping tears that turned into amber, associated the precious commodity with the mouth of the Po River,³ showing that the trade must have reached back into exceedingly ancient times. Herodotus reports its supposed origin at the mouth of a stream flowing into the northern sea,⁴ the Eridanus, a name which later came to be identified with the Po. He also clearly indicates a route of communication from the far northern land of the Hyperboreans, which emerged at the head of the Adriatic and passed down this sea to Epirus.⁵ The offerings to Apollo's shrine at Delos which he describes as taking this long journey were probably forwarded down the Adriatic by the trading ships of Corcyra and Epidamnus, which nearly three centuries before had been colonized by Corinth for the purpose of exploiting the commerce of this basin. The inland trade from the head of the Adriatic was appropriated at an early date by the Etruscans, and pushed with an assiduity which suggests that besides amber, other valuable northern products, like gold and tin from mines in the Archean rocks of the Bohemian massif, may have reached the Mediterranean by the Peartree route.

According to a tradition reported by Pliny, the Argonauts sailed up the Danube and Save to the head of navigation on the Laibach, and there built a settlement which they called Nauportus, because from there they carried their ship "Argo" across the mountains on men's shoulders to the Adriatic.⁶ The feat is not impossible, in view of the elevation of Nauportus (970 feet), only 2,000 feet below the pass; the probable presence here of stalwart mountain packers, such as are found in all pass regions of the world; the desire of such poverty-stricken mountain tribes to make money by this service and by levying tolls on the traffic over their mountain trails; and especially in view of the small vessels of this legendary period.

¹ Mommsen: *op. cit.*, I, Book I, 177, 196, 266.

² Pliny *Historia Naturalis* xxxvi. 2. 11.

³ Diodorus Siculus v. 22 (Paris, 1855). Pliny *op. cit.* iii. 30.

⁴ Herodotus iii. 15.

⁵ Herodotus iv. 33.

⁶ Pliny *op. cit.* iii. 22.

The Homeric Greeks had boats of only twenty oars. The large penteconter of fifty oars hardly came into use before the eighth century B.C., and it appears in the later Homeric poems as a masterpiece of sea-craft.¹ When one considers that the Bolivian Indian carries 150 pounds of rubber over the Andean watershed,² and that the tea-packer of Western China shoulders a burden of 300 pounds for the arduous ascent of the Central Asiatic Plateau,³ a twenty-oared boat carried on "the shoulders of men" across the Peartree Pass seems an easy undertaking for a group of mountain porters. It may be the first historical mention of the watershed "portage" or "carry," which is a regular feature of primitive inland navigation the world over. The portage is a commonplace of the Indian canoe routes in the Western Hemisphere, in the pioneer exploration and fur trade of Canada, the United States, Russia, and Siberia. Isthmian portages were familiar to the Greeks from very ancient times on the Isthmus of Corinth, in Eastern Crete, and probably on the narrow Dalmatian islands.⁴

In the case of Pliny's story, what probably happened was that some enterprising Greek inland traders may have found their way up the Danube to the Laibach, made their "carry" to the Isonzo River and Adriatic, and after long years their bold exploit was embodied into the tradition of the Argonautic expedition. Such was the process of accretion by which the *Odyssey* grew. The use of this portage path for boats may have given rise to the persistent impression among the ancients that there was river connection between the head of the Adriatic and the Danube.⁵

Strabo emphasizes the value of the Mons Oera route for forwarding military supplies to the Roman armies engaged in war with the Dacians on the lower Danube. But this was only part of the traffic. Merchandise in large quantities was carried by wagon from Aquileia to Nauportus, and thence by boat to Segestica (Sisek), an important distributing point at the confluence of the Save and Kulpa rivers. There was an active trade between Italy and the barbarians of the upper Danube. The exchanges were the usual ones between two regions of different climates and contrasted economic development. The barbarians sent over the pass cattle, hides, slaves captured in their incessant border wars, gold from the Alpine mines, resin, pitch, and other forest products. They received in return the oil and wine of Italy, fine fabrics of Mediterranean make, glass, and pottery.⁶ The flourishing emporium for all this trade was the fortified town of Aquileia, at the head of the Adriatic.

¹ Bury, J. B.: *op. cit.*, 109.

² Church, Col. George E.: "The Acre Territory and the Caoutchouc Region of South-Western Amazonia," *Geogr. Journ.*, XXIII, 596-613.

³ Huc, M.: *Journey through the Chinese Empire* (New York, 1871), 39-40.

⁴ Rudolphi, Dr. H.: "Trageplætz und Schleppwege oder Portagen," *Deutsche Rundschau für Geographie*, XXXIV, 66.

⁵ Pliny *op. cit.* iii. 22. Apolonius Rh. iv. 283. Strabo iv. 4. 9. Aristotle *Historia Animalia* viii. 13. Supported also by Hipparchus and Theopompus.

⁶ Strabo iv. 6. 9. 12; v. 1. 8; vii. 5. 2.

The location of Aquileia was not altogether a fortunate one, however. Here on the eastern land frontier of Cisalpine Gaul lay the weak spot in the Alpine frontier of Italy. Here, therefore, at the eastern extremity of the big province lay the local capital, Aquileia, in a position of opportunity, but also of danger. The city was founded in 181 B.C., soon after the Roman conquest of the region, as a fortress against intrusive Celtic peoples, who were already beginning to threaten this vulnerable frontier. Their first detachment came in 186 B.C., quietly enough, though they could muster 12,000 fighting men, Livy tells us.¹ They were bent upon peaceable settlement, so they arrived with "all their property which they had brought with them or driven before them." The road which they took across the forested mountains was previously unknown to the Romans, but it lay at the very head of the Adriatic.² They emerged from this unknown pass upon the Venetian plain, and set to work building their villages in the vicinity of the later Aquileia. But they were ordered out by the Roman proconsul, and had to obey.

The Senate, finding the Alps in this region not the "almost impassable barrier" that they had supposed them to be, established Aquileia as a Latin colony to protect the border. The new settlement was a peculiarly remote outpost of the military frontier. The nearest Roman colonies, which marked the line of continuous settlement and of assured civil government in the young province of Cisalpine Gaul, were Bononia, Mutina, Parma, and Placentia. All were located at the northern foot of the Apennines along the new Via Æmilia, and all had been built within the four previous decades. Then only two years after the founding of Mutina, Aquileia was established over a hundred and fifty miles away, an ethnic island, dropped down in a sea of Veneti allies. A sudden protrusion of the frontier like this means that the expansion is necessitated by danger or suggested by opportunity. The situation evidently required peculiar inducements, for the 3,000 militia colonists who were assigned to Aquileia received extraordinary allotments of land, 50 *jugera*, or 32 acres, to every foot soldier and 150 *jugera*, or 96 acres, to every horseman.³ This was eight or ten times the usual allowance.

The border cantonment was established none too soon. In 179 B.C. came another Gallic band of 3,000, pushing across the Alps and asking for land. More serious seemed the threat of Philip of Macedon to lead a horde of his mountain barbarians into Italy by this convenient northeast frontier. So the Romans, preparing for all emergencies, conquered the Peninsula of Istria in 177 B.C. to extend their scientific mountain boundary, to secure their sea communication with Aquileia, and to suppress Illyrian piracy in the upper Adriatic.⁴ The appearance of the migrating Cimbri

¹ Livy *Historia* xxxix. 22. 45.

² Mommsen: *op. cit.*, II, 232-33.

³ Livy *op. cit.* xxxix. 34.

⁴ Heitland, W. E.: *The Roman Republic* (Cambridge, 1909), II, 141-42.

at the approaches to the eastern Alps in 113 B.C. summoned the Roman army to the heights near Aquileia in order to protect the passes, but the barbarians withdrew, only to find their way by the upper Danube and the Burgundian Gate to the Rhone Valley approach to the Mediterranean.¹

The policy of the Romans on this northeast frontier was quiescent and defensive. The Peartree Pass was the back door of Italy; the Danube Valley, on which it opened, was a back street of the continent. Italy and the Tiber Valley fronted on the western Mediterranean. This was the result of the eastward curve of the Apennines, which threw the large populous plains and valleys on the sunset side of the peninsula, and centered their interests on the western sea. Therefore Rome's inland expansion first sought the Rhone Valley breach to the north, though the Peartree Pass route had been known to the Etruscans, the most ancient commercial expansionists of Italy. Genuine expansion beyond this mountain boundary began in the time of Augustus with an effort to police this frontier, a common first forward step. Depredations of the mountain tribes behind Istria upon Tergeste and Aquileia in 35 B.C. necessitated the conquest of all the highland hinterland.² In 10 B.C., the process had to be repeated in order to teach the predatory tribes of the Julian Alps respect for property, and especially to open up the Peartree Pass route for merchandise and armies bound for the new Danubian provinces. Ere long a Roman road crossed the Mons Oera to the colony of Æmona, where Laibach now stands. Siscia on the lower Save became an important garrison town.

During the *Voelkerwanderung* the danger of invasion was always imminent. The towns of Venetia were the first to glut the barbarians' greed for massacre and rapine, because the Danube avenue, immemorial highway for the packs of human wolves from the Russian and Asiatic steppes, led straight to the mountain door of the Venetian plains. The first historic invader to cross the Peartree Pass and spread his tents upon the banks of the Sontius was the emperor Theodosius the Great. In 388 A.D. and again in 394 A.D. he advanced from Constantinople up the Danube to interfere in the turbulent affairs of decadent Rome. Siscia on the lower Save, Æmona, and Aquileia saw his formidable army, and the battle of the Frigidus River below the Peartree Pass determined the conquest of the Roman Empire of the West by the Roman Empire of the East.³

The Visigoths, who participated in the campaign of Theodosius, learned how easy was the road to Italy and how weak were the defenders. Under their leader Alaric in 402 to 403 they invaded Italy. Taking the route through Pannonia to the Julian Alps, they pushed aside the guardians of the pass and descended rapidly to the siege of ill-fated Aquileia. Alaric overwhelmed Venetia and the neighboring Peninsula of Istria; but, defeated by the Roman general Stilicho at Verona and Pollentia, he

¹ Mommsen: *op. cit.*, III, 215-16, 221.

² Bury, J. B.: *History of the Roman Empire* (New York, 1909), 95-98.

³ Hodgkin, T.: *op. cit.*, I, Book I, 159-69.

retired from Northern Italy, checked but not broken. The Romans found him an enemy to be conciliated, for they appointed him *magister militae* or commander of the Roman armies throughout Illyricum, which included Pannonia and Dalmatia. Thus they utilized his barbarian forces as a border defense on a weak and exposed frontier, as nations have been wont to employ their nomadic or semi-nomadic neighbors in all times and all parts of the earth.¹ Alaric now held a strategic position. He fixed his camp at Æmona, where the Peartree Pass road reached the Save River. From that base he demanded the pay due himself and his men for their services, and when he failed to get it from the disorganized government, he again invaded Italy in 408. Once more the Peartree Pass led him over to the siege of Aquileia and the other Venetian towns,² and the ancient Etruscan route from the mouth of the Po over the Apennines guided his forces to Rome. After the siege and sack of the capital, Alaric demanded territory for his Visigoths in Venetia, Dalmatia, Pannonia, and Noricum, and the office of *magister militae* for himself, so that he might again command the important line of communication between Italy and the Danube.³ His sudden death put an end to this demand, but his victorious followers moved westward out of Italy into Southern Gaul, where they received an allotment of land.

The departure of the Visigoths from the territory of Illyricum had left a vacant border. This meant that the gate of the Julian Alps was thrown open as if in invitation to other rude visitants. East of the previous Visigothic settlements in Pannonia lay the great empire of the Huns, who for a century had been pushing up the Danube Valley. Checked by the German tribes of Northern Gaul in his efforts to conquer that region, Attila, king of the Huns, turned toward the weaker prey of Italy. In 452 he led his savage hordes by the undefended road of the Julian Alps straight to the walls of Aquileia. Having sacked and destroyed that city, he laid waste the Venetian plains,⁴ whose refugees sought an asylum in the coastal lagoons and marshy islands to the west, and there gave rise to the terror-haunted beginnings of Venice. Attila withdrew to his home beyond the Danube, but the destruction which he wrought in the Po Valley had not been repaired before the Ostrogoths under Theodoric, in 488, moved westward from their capital, near the present city of Belgrade, up the valleys of the Save and Drave to the Julian Alps. They dropped down the valley of the Frigidus and pitched their camp by the Isonzo.⁵ Here, on this chronic battlefield, they defeated the Roman army of the emperor Odovacar.

¹ Semple, E. C.: *op. cit.*, 233-35.

² Hodgkin, T.: *op. cit.*, I, Book I, 250-51, 257-58, 280-82, 317.

³ Gibbon: *Decline and Fall of the Roman Empire* (London, 1908), III, 250-57, 275-76, 287, 312-13.

⁴ Hodgkin, T.: *op. cit.*, II, Book II, 164-70.

⁵ *Ibid.*, III, Book IV, 202-11.

Eighty years elapsed before the teeming hive of the Danube plain threw out another swarm. The next to mount the Julian barrier were the Lombards, in 568. In the course of long migrations they had drifted from the mouth of the Elbe River southward to Pannonia, and after a temporary halt they moved up the Save Valley through Æmona to the Peartree Pass and Venice.¹ This seems their probable route, though according to one authority they reached the Venetian plains by the higher and more difficult Predil Pass from the upper Drave Valley to the head of the Isonzo.² It is quite possible that the large and motley horde, incumbered by wagons, their families, flocks, and herds, found it necessary to use both routes in order to make a sudden descent upon the Venetian plains. From this base they ravaged all Italy, and eventually gave their name to the plains west of the Adige and north of the Po.

The easy approach up the long inland slope of the Julian Alps, the march across the low passes, and the swift descent down the steep seaward slope of the ranges was a historical event that must easily repeat itself. This was apparent to the new Lombard conqueror. Hence he opened a new chapter in the history of Northeastern Italy. He erected all the Venetian plain between the Mincio River, the Po, the Carnic Alps on the north and the Julian on the east, into the border Duchy of Friuli, with Forum Julii as its capital. To its Duke he intrusted the hazardous and responsible task of guarding the mountain passes leading to the Danube. The Duke stipulated for the noblest, most valorous Lombard clans to form his soldiery and the finest brood mares to sustain his border cavalry.³ Thus was established here a typical frontier principality of defense, after the order of the German *Mark*. A hundred years later its chief was called a *Markgraf*; and from this time for five hundred years, so long as the human cauldron on the Danube seethed and boiled and overflowed, there was always a *Mark* of fluctuating boundaries and varying name that rested upon the Julian Alps.

This Lombard frontier state took its name from its capital, Forum Julii (modern Cividale), originally a market built by Julius Caesar in the foothills of the Julian Alps. It was a typical pass town, located on the northeast margin of the Venetian plains where it could command the trade which the Peartree, Predil, and Pontebba passes brought over from Pannonia and Noricum. As a base for guarding these passes, the site offered better facilities than Aquileia, which never recovered from the Hun's attack and retained only ecclesiastical importance. The frontiers of the Duchy probably reached north to the summit of the Carnic Alps, east to the crest of the Julian Range and the Karst, south to the Adriatic coast, and west to the Tagliamento River. It therefore had natural or scientific boundaries on its exposed sides. On the north its Bavarian

¹ Villare, Pasquale: *Barbarian Invasions of Italy* (London, 1902), II, 279.

² Hodgkin, T.: *op. cit.*, V, Book VI, 158-69.

³ *Ibid.*, 160-61; VI, Book VII, 38-44.

neighbors were giving evidence of aggression. Slovenians, an advance guard of the great southern Slav migration, occupied the eastern slopes of the Julian Alps. They were a small detachment of herdsmen and farmers, who in reality served as a border outpost of defense against the dreaded Avars and other intrusive peoples of Mongolian stock occupying the middle Danube plains.

The mere presence of these nomadic hordes in the near-by pasture lands was a threat. In about 610 the Avars swept across the Julian or Carnic passes from the Save and Drave. They spread desolation among the Lombard cities of the Duchy of Friuli, much as the Lombards had done a few decades before among the Roman cities of this fertile but exposed province. After the raid they retired, only to return again in 663, this time by the Peartree Pass. In the chronic battlefield of the Frigidus Valley they defeated the Duke of Friuli, ravaged the Duchy, and again withdrew.¹ The Slav neighbors on the eastern slopes of the Julian Alps were probably impoverished by the Avar raids; for a few years after (688-700) they resorted to systematic cattle-stealing—the ancestral occupation of barbarian mountaineers—crossed the border and despoiled the herds in the Friulian pastures. Punitive expeditions to stop these depredations only served to incite the warlike spirit of the Slovenians. They invaded the Duchy by the Predil Pass, and defeated the Duke's forces in the valley approach below.² These Slovenians, however, gradually became assimilated, through constant intercourse, to the higher civilization of the Duchy of Friuli. Their territory, which received the Slav name of *Krajena* or *Krain*, or "frontier,"³ occupied the mountain country between the Kulpa River on the south and the Karawanken Alps hemming in the Save Valley on the north. It was conquered by the Duke of Bavaria in 772, and in 788 was embodied in the Frankish Empire by Charlemagne, who thus secured the strategic portion of the old Roman Pannonia for the defense of his wide dominion, and erected it into the *Mark* or March of Friuli.

During the ninth century, the Karling kings of Italy paid much attention to strengthening this weak frontier. They extended the March of Friuli west to the Adige River and reinforced it by the addition of the March of Istria, thus giving it command of the whole stretch of the Julian Alps and Karst highland down to the present Gulf of Fiume. Beyond the crest, on the eastern slope, they had an additional defense in the *Krain*, or March of Carniola, which formed a frontier state of the east Frankish Kingdom or German Empire.

During the ninth century these three Marches served as outposts against the migrant Avars. At the end of this period they faced a new enemy from the Danubian plains. These were the Magyars or Hungarians.

¹ *Ibid.*, VI, Book VII, 50-54, 286-87.

² *Ibid.*, 328-31.

³ *Encyclopaedia Britannica*, art. "Carniola."

For a long time they had been moving along the broad highway of migration across Southern Europe, pressing on the rear of the Slavs and Avars, till they occupied all the present territory of Hungary except the narrow arm of land stretching through Croatia to the Adriatic. The exposed duchies of the German Empire threw out a series of defensive vassal states, endowed with unusual privileges and unusual responsibilities, as buffers and bulwarks against the enemy. It was a political process of thickening the hide of the Empire, so to speak. It was a process as natural as that of protective coloring in plants and animals, and it is one that has been developed on exposed boundaries the world over, and the ages through.¹

These German border states established to ward off Hungarian aggression were the March of Moravia, the March of Austria, the March of Carinthia, the March of Styria, and the March of Carniola. Behind the last lay the Italian March of Friuli, which was also of Teutonic origin. The *Markgraf*, or ruler of a March, had the legal status of the older counts, but he controlled a much larger territory and enjoyed far greater independence, as his dangerous frontier location demanded. He exercised justice, maintained a standing army, and had the right to call out militia from his population; but in return for this enlarged authority he assumed the grave responsibility of defending the border state.²

The proximity of Italy tempted the first inroads of the Hungarians. In 899 or 900 they descended from the mountain rim of Friuli, "the most harmful door left open by nature to chastise the faults of Italy," and ravaged as far west as Pavia.³ They came again in 921, and yet again in 924 at the request of King Berengar, who was on friendly terms with the Hungarian chief, but was threatened by his rebellious Lombard vassals. These facts suggest steady intercourse, probably commercial, between the Italian cities and the barbarians, by way of the Julian Alps and the Karst passes. The desolating raids became almost annual, spreading farther and farther—to Apulia in 922, to Rome in 926, and to Capua in 937. They emerged upon the horizon of Italy somewhere in the Friulian or Venetian plains, *per ignotas vias*, the chronicler says,⁴ but they had no connection with the numerous Hungarian incursions along the upper Danube Valley into Bavaria, Swabia, and Alsace. These facts seem to justify the assumption that they came by the old eastern passes, especially since the northern passes had long been guarded by the Bavarians. When the German king, Otto the Great, became overlord of Italy in 952, he transferred Friuli, now called the March of Verona, and the March of Istria to the Duke of Bavaria, who at the same time ruled over Carinthia and the March of Carniola.

¹ Semple, E. C.: *op. cit.*, 233-34.

² Waitz, G.: *Deutsche Verfassungsgeschichte* (Kiel, 1876), VII, 84-94.

³ Thayer, William R.: *Short History of Venice* (New York, 1905), 32.

⁴ Marquart, J.: *Osteuropäische und ostasiatische Streifzüge circa 840-940* (Leipzig, 1903), 156-58.

Thus he effectively closed the way to Italy against the raids of the Hungarians.¹ A little later, in 976, Carinthia was erected into a duchy, ruling over the vassal Marches of Friuli, Istria, and Carniola, and served, like Bavaria twenty years before, as a sort of chief of the border police.

These frontier provinces were transferred so often and so arbitrarily by the politician emperors of the Middle Ages in payment for votes in the imperial elections that any geographical law in the combinations became obscured. However, one or two principles emerge out of the chaotic changes. The March of Carniola, because of its location across the sunny path to Italy, retained longest (till 1254 or later) the March constitution and privileges which at once facilitated and repaid the task of defending the frontier. There seems to have been a recognition of the fact that this border state on the eastern slope of the Julian Alps was only a part of a geographical whole; therefore a recurrent tendency is revealed to combine it with Istria and Friuli,² and thus to round out the geographical whole comprised in all the wide frontier zone of defense.

The growing Republic of Venice during the twelfth and thirteenth centuries gradually absorbed most of the coastal belt of the Istrian Peninsula. This brought a turning-point in the history of Carniola. The March acquired nearly all the territory that was left of the old March of Istria, and for the first time (*ca.* 1250) it had a small littoral of its own on the Gulf of Trieste and the Gulf of Fiume. Moreover, it extended to the lowlands of the Isonzo, though not to the river. In other words, the March of Carniola was astride of the Julian Alps and the Karst Plateau, with a foot resting on the Adriatic shore. This location gave it an entirely new significance and value. It was no longer merely a strategic border state, but a border state with a sea front, and as such it became an object to the inland states.

Carniola was momentarily acquired between 1269 and 1276 by King Ottocar of Bohemia and Moravia, who had managed to get into his own hands all the old belt of March lands stretching from the Julian Alps to the head of the Vistula and Oder rivers in the Moravian Gates. Since he had shortly before founded the city of Königsberg on the coast of East Prussia,³ his long-strung possessions comprised most of the old amber route. Ottocar was forced by the emperor Rudolph of Hapsburg to renounce his recent acquisitions, all of which except Carinthia and Carniola went to found the fortunes of the House of Hapsburg. Later we find another Bohemian king endeavoring to secure for Bohemia those important territories as a passway to Italy.⁴ His plans were frustrated by the growing power of Austria, which also felt a vital need of stretching its frontier to Italy and the sea, and which in 1335 acquired Carniola.

¹ Huber, Alfons: *Geschichte Oesterreichs* (Gotha, 1885), I, 136.

² *Ibid.*, 218-20.

³ Freeman, E. A.: *Historical Geography of Europe* (London, 1882), 319.

⁴ Coxe, William: *History of the House of Austria* (London, 1847), II, 105-6.

This marchland of Carniola, which had originated on the eastern slope of the Julian Alps as an outpost of successive Italian powers, now faced about westward. It became Austria's exposed frontier toward expanding Venice, and gave to inland Austria its first narrow foothold upon the sea. While its eastern border never changed, thus evidencing the equilibrium between pressure and counter pressure of nations in the Danube Valley during the later Middle Ages, on the west Carniola gradually acquired the valley of the Isonzo River and the base of the Istrian Peninsula. Thus it comprised all the weak highland barrier which it served to defend. Its western frontier toward Italy constantly fluctuated; but throughout its subsequent history from 1335 till 1807 it managed to keep some strip of seaboard on the Adriatic, at Trieste or Aquileia or on the littoral between, besides a coastal *pied de terre* on the Gulf of Fiume. This it accomplished despite the century-long efforts of the Venetian Republic to exclude Austria from the Adriatic, and to get closer access to the trade routes leading over the Peartree and Pontebba passes. By these routes Venice fed her products into backward Austria. During the Middle Ages 40,000 packhorses came yearly from the north down to Istria to take back Venetian salt to the Austrian Empire.¹

When the fall of Constantinople let loose another flood of barbarians into the flat Danube plains, Carniola again became the fighting marchland. Under the hot blast of Turkish attack Hungary shriveled up like a dead leaf. Its frontier rolled back within forty or fifty miles of the old Austrian Marches. Across this narrow buffer territory poured the Turks into Carniola, in 1463, 1472, 1473, 1493, 1521, and again in 1559.² Laibach saw the Mongol cavalry around its walls.³ Once more the migrants of the Danubian plains stormed this half-open door of Italy. Once more the geographical location of Carniola made her the mountain warden of Venetian Italy until, in 1683, the Turkish advance spent itself and gave place to a century-long retreat.

During the Napoleonic Wars these lines of easy communication between Austria and Italy were the scenes of marching and counter-marching. Napoleon, in 1787, erected a new Illyrian state out of Carinthia, Carniola, Goerz, Istria, the coast of Dalmatia, and Croatia, to be "a guard set before the gates of Vienna," as he said.⁴ With true geographical insight he was reviving the old March of the Julian Alps and the Karst Plateau with somewhat extended boundaries.

In his great Austrian campaign of 1797, from his base at Treviso, north of Venice, Napoleon met the same military problem, determined by

¹ Thayer, William R.: *op. cit.*, 93.

² Abbot: *Austria, Its Rise and Fall* (New York, 1902), 70, 71, 75, 83, 146, 147. Huber, Alfons: *op. cit.* (Gotha, 1892), IV, 13.

³ Leger, Louis: *History of Austro-Hungary* (London, 1889), 154, 258.

⁴ Seton-Watson, R. W.: *The South Slav Question, and the Hapsburg Monarchy* (London, 1911), 26.

geographic conditions, as that now facing the Italian army of invasion in 1915. His method of solution was the same. He sent Jourbert with an army by the Adige Valley into the Tyrol, and Messena by the Pontebba Pass and the Col di Tarvis into Carinthia, to intercept Austrian reinforcements coming either from Germany or from Vienna. He himself attacked the Austrian army under the archduke Charles on the Tagliamento River, drove them back across the Isonzo, took Gradisca, Monfalcone, Trieste, and Fiume, and made his temporary headquarters at Goerz, an old stronghold at the outlet of the Wipbach Valley. From there he sent Bernadotte to pursue the archduke Charles, who had retired from Goerz across the Peartree Pass upon Laibach, and to occupy Carniola. Napoleon sent another force on the trail of a second Austrian army, which was withdrawing up the Isonzo Valley to the Predil Pass in the hope of securing the Col di Tarvis and the road through Carinthia to Vienna. It was crushed, however, by Massena's army, which was waiting for it above, and the pursuing army, which Napoleon accompanied. The commander made his successive headquarters at Goerz, Caporetto, Tarvis, and Klagenfurt in Carinthia, where he reunited the three divisions of his army for the advance upon Vienna.¹

In the Franco-Austrian War of 1809, Austrian forces under Archduke John invaded French Italy by the Pontebba-Col di Tarvis route and defeated the opposing army at Sacile, just west of the Tagliamento.² But subsequent reverses in Italy and discouraging news of the progress of the war in Austria forced the archduke John to retreat by Pontebba Pass and Col di Tarvis into Carinthia, which, together with Carniola, was soon after abandoned to the pursuing French. Napoleon in his congratulatory address to the army of Italy enumerated the scenes of their victories, names familiar to history, the upper Tagliamento Valley, Tarvis, Fort Malborghetto, Goerz, the Save, and the Drave.³

The Italian armies of King Victor Emanuel are compelled by geographic conditions to follow in the footsteps of Napoleon and his generals. One has advanced by the Adige Valley north into the Trentino or southern Tyrol; another has moved northeast across the Pontebba Pass, to sever the Trentino's communication with Vienna through the longitudinal valley of the Pusterthal and to protect the Venetian plains from a flank attack; a third army has marched east across the Isonzo, taken the border defenses at various points along the left bank of the river, and now is planning to invest the strong fortress of Goerz, while another division has occupied Monfalcone on the advance to Trieste. The rapidity of the several movements, however, as compared with those of a century ago, is much slower. It is retarded by the vastly increased difficulty of forcing

¹ Fournier, August: *Napoleon the First* (tr. from the French, New York, 1904), 97-98. Hazlitt, William: *Life of Napoleon* (London, 1830), II, 23-26.

² *Cambridge Modern History* (New York and London, 1906), IX, 355.

³ Hugo, A.: *Geschichte des Kaisers Napoleon* (tr. from the French, Stuttgart, 1834), I, 415-17, 429.

mountain passes which are defended by modern fortresses, by masked artillery stations tunneled into mountain walls with only an external orifice for the cannon's mouth, by long-range guns in commanding positions, and by wire entanglements. These military equipments of defense have restored much of the pristine barrier nature of mountain boundaries which was theirs before the construction of roads and the clearing of forests. The present campaign in the Julian Alps may therefore prove these highlands to be the "almost impassable barrier" to hostile invasion which they were considered to be over two thousand years ago by the Roman Senate. Such is the power of human inventions to modify the effect of geographic conditions.

The accessible nature of the Julian Alps and the Karst Plateau under normal conditions is evidenced also by the distribution of population in these highlands, and by its ethnic elements. Nowhere else in the whole semicircle of the Alps does the density of population exceed one hundred to the square mile (forty to the square kilometer) across the summit of the mountains, except along the thickly settled littoral of the French and Italian Riviera, where the Maritime Alps sink down to the Mediterranean. Moreover, there the density decreases to half this number a few miles back from the coast, whereas it is maintained across the Karst Plateau in a broad belt from Goerz to Laibach, extending south to Fiume.¹

Ethnology also reveals the breachlike character of the Julian Alps. Throughout the Venetian plains today, as far west as the Mincio River, the inhabitants are distinguished by a tall stature, rare among pure Italians. There is no doubt the underlying stock of the ancient Venetians, generally considered as a lowland offshoot of the tall Illyrian race, which is found today in Bosnia, Montenegro, and Albania, and which has given some additional inches to the later Slav immigrants.² As the Julian Alps were no barrier to the tall Illyrians, neither were they to the Slovenians, the subbranch of the Slav people, who, in the seventh century, pushed up the Save Valley from the east, and today cover the intervening territory down to the Isonzo. At one point they lap over the frontier into Italian territory, but the old district of Aquileia and the Istrian littoral within the Austrian border are still Italian,³ and still hope to be incorporated in the modern Kingdom of Italy. All this region up to the summit of the Julian Alps forms part of *Italia irredenda*. Its recovery will give the peninsular kingdom a scientific frontier and deprive Austria of her present advantage in offensive and defensive warfare on this border.

THE RHONE VALLEY BREACH.—Different from the low Karst saddle and the marine passage of the Bosphorus and Hellespont is the third breach in the mountain barrier, formed by the Rhone-Saône-Doubs groove.

¹ Diercke: *Schul-Atlas* (Brunswick, 1909), 89, 128. Krebs, Norbert: *Länderkunde der oesterreichischen Alpen*, 413.

² Ripley, W. Z.: *Races of Europe* (New York, 1910), 255-268.

³ Diercke: *op. cit.*, "Ethnographical Map," 124.

Like the other two, it connects with the Mediterranean Basin a region of strongly contrasted climatic conditions and, during ancient and mediaeval times, of contrasted economic and industrial development. Remote from the early eastern centers of urban life and progress in the *Ægean* and the Levantine basins, this Rhone breach came much later upon the historical stage than did the Bosphorus-Hellespont. It assumed an important rôle only after the Roman Republic had transferred the big dramatic events of Mediterranean history to the western basin by encircling that basin with a rim of Roman lands. To compensate for this tardy appearance, it has played a peculiarly important part in the history, not only of the Mediterranean, but of all Northwestern Europe. It made Gaul, and later France, one great transit land. Through it Roman civilization penetrated into Gaul, and spread from the radiating passes at the head of the Rhone-Saône Valley west and north over all that province into Britain, and finally eastward over the Rhine into Germany. The location of the Alpine barrier and the Rhone breach combined to retard the dissemination of Roman culture into Germany, and at length admitted it only in a Gallicized form. During the decline of the Roman Empire, the Rhone breach became in turn the passway for German tribes migrating south. The local population there today reveals in its fairer coloring and tall stature the ethnic infusion of the blonde giants of the north. Linked geographically with the north, the valley became linked ethnically as well with the Teutonic peoples who had drifted along the shelving coastal plains of Germany and France.

Thus the Rhone Valley breach performed the great historical service of uniting the maturer civilization of the warm Mediterranean lands with the growing civilizations around the colder thalassic basins of the English Channel, the North Sea, and the Baltic. These northern seas, in turn, distributed to all their shores the germs of culture brought up from the south. Through the instrumentality of Flemish, Dutch, German, Hanseatic, and English traders they raised the *niveau* of civilization in these retarded northern lands. The similar seed of Greek culture, planted early and thickly on the southern shores of Russia, found no such favorable conditions for transplanting to the Russian north. Many were destroyed by the nomadic invaders from Western Asia before they had well taken root on the Scythian coast. The few that were disseminated northward to the chill plains of Central Russia lost their vitality. Far from the vivifying contact with the sea, impoverished by the lack of fresh accessions, they did not breed true to their type, but languished in dwarfed and flowerless form on the monotonous steppes. The ultimate environment of the Bosphorus breach is found in the Valdai Hills, the Volga plains, and the Caspian desert, as that of the Rhone breach is found in the shores of the northern seas.

While the Bosphorus-Hellespont breach dates back only to Quarternary times, the Rhone groove has an old geological pedigree. It is not a mere

river valley of erosion, though erosion has carved out some of its minor physiographic features; but it traces back its ancestry to a long marine inlet or strait which in Eocene and Miocene times penetrated northward through a narrow belt of depression between the young folded ranges of the Alps and Jura on the east and the steep escarpment of the old Cevennes Plateau on the west. This sea-arm filled the present valleys of the Rhone, Saône, and Doubs, and south of the granitic Vosges massif it connected with another inland sea, which in the early Tertiary period occupied the entire Vienna Basin. The slow elevation of the later Miocene closed the strait at its northern end, but left traces of its geological past in the broad gap between the Jura and the southern face of the Vosges, while the Rhone-Saône depression was converted into a long, pouchlike inlet of the sea. Finally, in the Pliocene, the Rhone-Saône emerged as it is today, a great river flowing through a narrow plain, fed by the big streams that drain the western slopes of the Alps and Jura, and the short torrents which at close intervals scar the long front of the Cevennes escarpment.¹

The Rhone System opens a navigable highway straight north from the Mediterranean for 340 miles (550 kilometers), half-way across the base of the Gallo-Iberian peninsula. At its northern end lies the chief hydrographic center of Western Europe. Here it connects with a group of navigable rivers which radiate from its low encircling watershed, and open out natural routes of communication to the Bay of Biscay, the English Channel, the North Sea, and even the Black Sea through the near-by head streams of the Danube River. Scarcely a tidal wave of invasion that swept the western shores of the Black Sea failed to spread up the Danube Valley also and to reach in its ultimate wash that old geological gap between the Vosges and the Jura.

This is the famous Pass of Belfort, known in ancient and mediaeval times as "The Burgundian Gate," a broad gap about 18 miles wide (30 kilometers) lying only 1,138 feet (347 meters) above sea-level. It unites the Rhone groove with the long, fertile rift-valley of the northward-flowing Rhine. Together these formed the chief historical highway of ancient and mediaeval times between the Mediterranean and the North Sea. Migrant hordes, with their wagons and cattle, moving westward from the upper Danube Valley or southward along the Rhine trough from the chill Baltic plains, converged upon this open gateway leading to the sunny shores and rich cities of the Roman Mediterranean. They beat out tracks which were later transformed into Roman roads. Centuries later a canal from l'Isle, the head of navigation on the Doubs, connected that river with the Ill at Muelhausen and the Rhine at Basel.

Meantime a long chain of cities, united by commercial interests, had grown up along the Rhone, Saône, Doubs, Rhine, and the network of channels in the Rhine Delta to expedite the trade between two contrasted

¹ Chamberlin and Salisbury: *Geology* (New York, 1906), III, 277, 319.

regions of production. The North Sea lands, located on the far outskirts of the ancient civilized world, retarded in their economic and cultural development by geographic remoteness and relatively harsh climatic conditions, commanded nevertheless the abundant raw materials of new, unexploited countries. As growing civilization and trade pricked the desire for luxuries, these raw materials enabled them to make a steady demand for the varied products of that subtropical and industrial Mediterranean world. Therefore Holland and Flanders, lying at the outlets of this Rhine-Rhone highway, were the first states of Northern Europe to feel the concentrated effects of Mediterranean culture, and to produce on these northern shores a replica of Mediterranean Venice, Pisa, and Genoa. In their splendid art, the rich fabrics of their looms, their brocades and tapestries, fine silverwork, printing, and map-making, we trace the Mediterranean lineage of their models.

Geographical companion pieces to the Burgundian Gate are found in the series of low passways which penetrate the hill country filling the older and broader geological gap between the Archean massif of the Vosges and that of the Cevennes Plateau. The long, sluggish Saône, which is navigable up to this hill country in the so-called *Monts Faucilles*, affords easy access to these watershed passes. They, in turn, have from the earliest times offered a wide choice of routes for intercourse between the Saône and the diverging rivers of France which drain outward to the North Sea and the Atlantic. Early migration, conquest, and trade sought them out and used them all. The easiest tracks beaten out by migrant barbarians traversing these uplands or the ones offering the shortest connection with tin-bearing Britain were later followed by Roman roads. Yet later most of them were utilized for water carriage by the system of canals projected by Sully in the sixteenth century. All combined to cement together the various parts of France.

The Saône connects with the Moselle near the great French fortress of *Epernal* by a broad, open pass, 1,135 feet (or 346 meters) high, between the Vosges and the *Monts Faucilles*. So low is the barrier that it has never presented an appreciable obstacle to communication between northern Burgundy and southern Lorraine. Here today one finds the same provincial accent, the same peculiarity of geographical names ending in *-ey*, the same type of rural house, and the same character of inhabitants on both sides of the low watershed.¹ Thirty miles to the west an easy pass route between the *Mont de Fourches* and the *Plateau de Langres* connects the Saône with the *Meuse Valley*; and yet another crosses the *Plateau of Langres* at 1,550 feet (473 meters), where canal and railroad now link the Saône with the *Marne*. This was the route of the chief Roman road leading northward to the Lower Rhine. It crossed the summit at the ancient town of *Andematunnum* (Langres), but turning thence across the upland to the Moselle at *Tullum* (Toul), it followed

¹ Vidal de la Blache: *Géographie de la France* (Paris, 1903), 234-42.

the valley of this river past modern Metz and Trier, and then continued north to the Rhine at Colonia Agrippina, the modern Cologne.

The Roman road to the Seine, which was probably the main route of the tin trade, was important because of this trade and also because the Seine offered the best navigation of all the northern rivers except the Rhine. The road left the Saône or Arar at the Ædunan town of Cabilonum (Chalons-sur-Saône), turned west past modern Chagny, and mounted the plateau rim now known as the Côte d'Or to the ancient Ædunan fortress of Bibracte, later to the nearby Roman town of Augustodunum (Autun). Thence it turned northwest, avoiding the granite massif of the Morvan Plateau, and followed the Yonne Valley across the Auxois plain down to the southern elbow of the Seine. The modern route from the Saône to the Auxois upland leaves the valley at Dijon and turns up the gorge of the Ouche, which is now traced by highway, the Burgundian Canal, and railroad. But the old road goes back beyond the memory of man. It was the route taken by Caesar in 58 B.C., when he turned aside from his pursuit of the retreating Helvetians to seek the big Ædunan town of Bibracte, eighteen miles away, where he hoped to find provisions for his soldiers.¹ Limestone buttresses running out from the base of Mont de Rome-Chateau, which overlooks the route, preserve for us today ruins of bygone habitations or forts, and testify to the importance of this ancient thoroughfare.²

Thus the upper Saône and Doubs command a semicircle of transmontane connections. Midway between these headwater passes and the Mediterranean is the confluence of the Saône and Rhone. Here lay the ancient city of Lugdunum (Lyons), which for centuries was the heart of Roman Gaul. It commanded not only the whole length of the Rhone-Saône breach, but also the east course of the Rhone, which opens a narrow and difficult route between the Jura and Savoy Alps to Lake Geneva and the lake plateau of Switzerland. This is the passage which the migrating Helvetians attempted to force in 58 B.C., and which Caesar defended.³ The swift and often turbulent current of this mountain course of the Rhone, its difficult navigation, and its gorgelike valley afforded a fairly good barrier boundary to the young Roman *provincia*, whose limits had shortly before been pushed northward to the Rhone and Lake Geneva.

This history of the Rhone Valley begins with the founding of the Greek colony of Massilia (Marseilles) in about 600 B.C. The site of the settlement was well chosen. Like many ports designed to exploit the commerce of big river systems, it was located, not at the mouth of the stream, but off to one side, where the constant deposition of deltaic mud could not silt up its harbor and spring floods threaten it with inundation. Such a location Massilia found where the hills of Provence run out as headlands

¹ Caesar *De Bello Gallico* i. 23.

² Vidal de la Blache: *op. cit.*, 240.

³ Caesar *op. cit.* i. 2-10.

into the sea east of the Rhone mouth. These afforded an acropolis for the city and a deep port, protected on the north by the long, bold promontory of the l'Estagne from the destructive blasts of the *mistral*. Small inshore islets to guard the approaches to the harbor, sunny hillsides for vineyards and olive orchards, and the near-by river for inland commerce added all the other elements considered desirable for a Greek colony.¹ The region yielded poor wheat crops, however, so the colonists were compelled to "trust more to the resources of the sea than of the land, and avail themselves, in preference, of their excellent position for commerce," as Strabo tells us.²

The southern approach to the Rhone Valley breach was made either by sea or by land. The shallow waters of the Gulf of Lyons, the weak tides of the Mediterranean, and the heavy burden of silt transported by the swift-flowing Rhone and Durance, all combined to build up a large deltaic plain, through which wind the tortuous courses of the Rhone distributaries. Like the outlets of the Nile, these varied in number from two to five at different periods and shifted their location.³ Access to them was difficult. The flat, alluvial shore was often difficult to discern in bad weather, as it lacked the bold sea-marks on which the Mediterranean sailor was wont to rely. The debouchment channels were constantly obstructed by the mud deposits at their mouths. As early as 101 B.C. Caius Marius, who probably took his troops by sea from some northern Roman port for the campaign against the Cimbri, found it necessary to construct a navigable channel through the lagoons and half-silted distributaries from the eastern outlet of the Rhone to a point above the delta, where the road crossed the river.⁴ These *fossae Marianae* he gave to the people of Massilia in return for their aid against the invaders. The city made revenue out of the canal by levying a toll on all boats using it.⁵ But the silting process in time impaired its usefulness, and threatened once more to block the entrance. Further obstacles to navigation were found in the powerful current of the Rhone, and the *mistral*, called by the ancients "the black north," which swept down the valley.

Ancient traffic on the Rhone seems to have been considerable, despite the difficulties of navigation. The Massilians were not the only ones engaged in this river commerce. When Hannibal in 218 B.C. crossed the Rhone on his march from Spain to Italy, he was able to buy numerous dugout canoes and boats from the natives, who used them in their extensive sea traffic.⁶ Massilia was the distributing center for the tin which found its way southward across Gaul from Britain⁷ and probably also from mines in the Vilaine Valley of Southeastern Brittany, where ancient workings have been found.⁸ Diodorus Siculus states that the tin of

¹ Vidal de la Blache: *op. cit.*, 341, 344, 345.

² Strabo iv. 1. 5.

³ Strabo iv. 1. 8.

⁴ Heitland, W. E.: *op. cit.*, II, 372.

⁵ Strabo iv. 1. 8.

⁶ Polybius *Histories* iii. 42.

⁷ Strabo iii. 2. 9.

⁸ Vidal de la Blache: *op. cit.*, 20-21.

Cornwall was collected for export on a small inshore islet of the British coast, a typical maritime market place. There it was purchased by merchants who took it over to Gaul, and transported it on horses, a thirty days' journey across the country, to the mouth of the Rhone.¹ The Massiliots set up merchantile factories in the Gallic towns to forward the British tin to the coast, together with the raw products of the interior. In exchange, they supplied the back country with fish, salt, olive oil, wine, bronze utensils, and pottery,² some of which undoubtedly found their way to that indented Cornwall peninsula first known to the ancients as the Cassiterides Islands.³ Through the Rhone Valley breach the cruder elements of Hellenic civilization thus trickled into Northern Europe, while the Greek language, alphabet, and economic methods were disseminated among the neighboring Gauls of the long Massiliot littoral.

The Rhone Valley breach is approached also by two land routes, one from Italy and one from Spain, which respectively turn the mountain barrier where the Maritime Alps and the eastern Pyrenees run out into the Mediterranean. These narrow passways between mountain and sea have always opened lines both of trade and of attack. Hence Massilia fringed them with her subsidiary colonies.⁴ She lined the Gulf of Lyons from Emporiae and Rhoda (modern Rosas) on the Spanish coast of the Pyrenees, around to Olbia (Eoube) and the Iles d'Hyeros on the east; farther on, Antipolis or Antibes, Nicaea or Nice, and Portus Monoeci or Monaco, strung along the rocky seaboard of the Maritime Alps, opposed the depredations of the mountaineers and maintained the connections of Massilia with its ally Rome.⁵

These routes became important also to the Romans after their acquisition of Spain from Carthage in 201 B.C. Hence their first systematic campaigns against the Alpine tribes and their conquest of the Rhone Valley were both inaugurated by attacks on the mountaineers flanking this route, the valiant Salluvii of the Maritime Alps and their Ligurian neighbors of the western Apennines. Like all highland tribes, they took advantage of their strategic location to maintain a system of pillage by land and sea, to block Roman traffic with Massilia and Spain, and even to obstruct the passage of Roman armies. The geographical relief of the country fought for them. It enabled them to maintain a guerilla warfare in intensity and duration out of all proportion to their numerical strength, after the manner of primitive mountain people the world over. In 125 B.C., after a conflict of eighty years, all that the Romans could force from the barbarians was a coastal strip, averaging a little over a mile in width, for purposes of a highway.⁶ The ceded strip was transferred to the Massiliots,

¹ Diodorus Siculus v. 22.

² Curtius, Ernst: *op. cit.*, I, 482.

³ Strabo iii. 5. 11.

⁴ Grote: *History of Greece* (London, 1854), III, 538.

⁵ Strabo iv. 1. 5.

⁶ Strabo iv. 6. 3.

who undertook to construct and maintain the coast road, since it united their settlements. Beginning at Genoa, where it connected with the Via Aurelia, the road ran west across the roots of the Alps between mountain and sea as far as the modern Frejus (Forum Julii). There it left the coast, which runs out southward into a blunt peninsula, and turning up the valley of the Argeus River, continued westward along a longitudinal groove between parallel hill ranges. Where it emerged upon the alluvial plain of the Rhone, just north of Massilia, the Romans built the garrison town of Aquae Sextiae (Aix) to guard the road.¹ This Massiliot highway was later replaced by the Via Julia Augusta in the early days of the Empire. Centuries afterward, in 1807, it was revived by Napoleon in the famous Cornice Road, which he built to connect France with his short-lived Kingdom of Italy. Thus geography turned back to the history of the imperial Caesars for a page to insert in the history of the great French Emperor.

From the military base at Aquae Sextiae, which commanded land and sea connection with Italy, began the Roman conquest of the Rhone Valley in 125 B.C. First the Salluvii between the Durance River and the sea were subdued, then their northern neighbors, the Vocontii, and finally in 122 B.C. the powerful Celtic tribes of the Allobroges, who inhabited the rich valley of the Isara (Isère) and the country north to Lake Lemanus (Geneva). The powerful Averni of the Cevennes Plateau, who had lent assistance to Allobroges, were forced to cede to Rome all the short south-eastern slope of their highlands to the Rhone and the Mediterranean as far west as Tolosa (Toulouse) on the Garonne River,² a territory comprised in the later French province of Languedoc. Thus practically all the Rhone Valley, north to the Saône confluence and to Lake Geneva, was comprised in the Roman province, except the coastal strip tributary to its ally Massilia. The geographic reasons are clear. The valleys of the Durance and Isère opened avenues of approach to the only two practical passes over the western Alps, the Mons Matriona or Mont Genevre at an altitude of 6,080 feet (1,853 meters), and the Little St. Bernard at 7,075 feet (2,157 meters). The latter was the unguarded door, hardly feasible for an army, which probably admitted Hannibal's forces into Italy, though it collected a frightful toll of life from his men and animals. Hence Hannibal's line of march, by the Pyrenean coast road, the valleys of the Rhone and Isère, and the Little St. Bernard Pass, determined with some accuracy the limits of early Roman expansion into Gaul.

On this point the first Roman road-building across the Rhone is instructive. From Arelate (Arles) at the head of the delta, where the passage of the river was easiest and where therefore the Massiliot road had its terminus, the Romans ran the Via Domitia westward around the Gulf of Lyons, through Narbo (Narbonne), capital of the new province,

¹ Strabo iv. 1. 5.

² Mommsen: *op. cit.*, III, 205-7.

and thence southward over the last spur of the Pyrenees into Spain. Here the massive form of the Pyrenees, stripping off its surplus folds before plunging into the sea, thrusts out an arm to the Mediterranean. This arm is the Alberes range, a single bold ridge deeply notched by the Col du Pertus (951 feet or 290 meters), which opens a low passway between the maritime plains of Roussillon in France and those of Ampurdan in Spain.¹ The sea-front of the Pyrenees forms a series of mountain headlands towering high above the fretting waves. It was enough to daunt the Roman road-builders, for it taxed the skill of the modern engineers, who by means of tunnels and galleries put through the coast railway here in 1880. The ancient gate of the Pyrenees lay, therefore, 7 miles back from the sea. Massilia had seen danger in this open door, and therefore planted along its southern approach several outpost colonies as bulwarks against Iberian invasion. Rome had seen it too, when the Carthaginians began to establish a new empire in Spain, and therefore in 225 B.C. exacted from the Carthaginian governor a pledge that he would make the Ebro River the northern limit of his conquests in Spain.² But when Hannibal was ready to invade Italy, he crossed the Pyrenees by the Col du Pertus,³ traversed Southern Gaul, and was already over the Rhone before the Roman army under Publius Scipio had landed in Massilia. From this time on through ancient and mediaeval history the Col du Pertus was a passway for migration and conquest.

It is significant of the purely Mediterranean outlook of the Roman Republic that it began its inland expansion up the Rhone Valley breach only under the spur of necessity. The century-long rivalry with Carthage kept it facing seaward, and forced it out of its peninsular isolation into wide maritime contact and dominion. Its great historical events were staged on the coasts. The hinterlands of the three surrounding continents as yet counted for nothing. Conquest of the lower Rhone Valley, the initial step of their inland expansion, was begun only after the annexation of Carthage in 146 B.C. had made the western Mediterranean basin a Roman lake, and after the Adriatic, the Ionian, and Ægean seas with their bordering lands had likewise been incorporated in the empire of the Republic. Moreover, the *Provincia Romana* of Gaul, located between the western Alps, the Cevennes escarpment, and the Pyrenees, was Mediterranean in its climate, its natural products, and also to some extent in its civilization, owing to the strong Hellenizing influences which for nearly five centuries had been emanating from Massilia. The province was organized and annexed in 121 B.C. Further expansion beyond the climatic limit defined by the Rhone elbow at the Saône confluence had to wait till 58 B.C., or over sixty years.

Meantime the *provincia* was having the typical experiences of a border district on an exposed frontier. While other Roman provinces like Sicily

¹ Vidal de la Blache: *op. cit.*, 355-56.

² Heitland: *op. cit.*, II, 223.

³ Polybius *op. cit.* iii. 9; xxi. 23, 24.

and Spain suffered from local revolts against an oppressive government, this one alone suffered from foreign incursions. Therein it anticipated by some five hundred years the similar historical events of Pannonia and the Julian Alps, growing out of similar geographic conditions. It became in effect a Marchland, after the order of the later German *Mark*; and it duplicated the history. First a border district of defense, it passed suddenly to a more brilliant rôle as a base for conquest and expansion. Often a geographical handicap may be converted into a geographical opportunity. It is a matter of tipping the scales.

Rome secured her end of the Rhone Valley breach not a moment too soon. Immediately she began to encounter here a persistent stream of Germanic expansion, which selected this easy path to the sunny Mediterranean lands. Hither, in 109 B.C., came the Cimbri, who four years earlier had been ordered off from that half-open door of the Julian Alps. The door was wide open here, so they defeated the Roman army somewhere in the Rhone Valley. They returned in 105 B.C., hurled aside the Roman army stationed at Arausio (Orange) on the lower Rhone to obstruct their course, and passed on victorious by the near-by Pyrenean gate into Spain. They wandered in Spain and Gaul for two or three years, but were soon back, nosing like hungry dogs about the doors of Italy.¹ This time (102 B.C.) the Cimbri found a way to the Po Valley by the Brenner Pass (4,470 feet, 1,362 meters) over the Central Alps; but their allies, the Teutons and Ambrones, came down the Rhone Valley. Caius Marius, Rome's great general, four times in succession elected consul in anticipation of this danger on the Rhone, was sent to oppose them. He let the barbarians trek past his camp on the lower Isère, where he had taken his stand to head them off from the western Alpine passes; but near Aquae Sextiae (Aix), at the entrance to the Massiliot coast road to Italy, he stopped their advance by a crushing defeat in 101 B.C.

The real points of danger for Rome lay in that semicircle of passes crossing the watershed of the upper Saône and Doubs. The country between the Saône and the Rhine was held by the Sequani, who thus commanded the Burgundian Gate; that between the Saône and the plateau course of the Loire and Seine systems was occupied by the Ædui, who thus controlled the western passes. Rivalry existed between the tribes, because each claimed exclusive right to the Saône and especially to the tolls levied on passing vessels.² The Romans, stretching their sphere of influence to this strategic locality where lay the keys to the Rhone Valley door, made an alliance with the Ædui, and enabled them to exclude the Sequani from the profitable Saône commerce. The Sequani, in turn, invited in Ariovistus and his German horde who dwelt just across the Rhine, and in 62 B.C. by their assistance defeated the Ædui. The bars of the Burgundian Gate were down. The Germans kept pouring into

¹ Heitland: *op. cit.*, II, 363-66, 372-73.

² Strabo iv. 3. 2.

Gaul and settling in the Sequani land. Ariovistus had a German province there by 58 B.C., when Caesar, adopting an aggressive policy, moved up the Saône Valley to prevent the Helvetian invasion. This accomplished, he prepared to attack the Germans, who showed no inclination to withdraw from their newly acquired territory. He advanced up the Doubs Valley and seized the Sequanian fortified town of Vesontio, which occupied a strong location within a circular loop of the Doubs and which survives today as the great fortress of Besançon. From this town as a military base he attacked the Germans near the Rhine and drove them across the river out of Gaul. That autumn the army of Caesar went into winter quarters in the Sequanian territory.¹ Rome held the Burgundian Gate.

Thus began the conquest of Gaul. The significance of the movement for the Romans lay in the complete control of the Rhone Valley breach and its inland approaches; in the protrusion of the frontier far beyond the danger line found in that semicircle of watershed passes; and in the inland extension of Roman trade routes. For the world at large it meant the advance of historical events beyond the narrow rim of the Mediterranean Basin to the contrasted Atlantic lands of Europe.

The conquests of Caesar checked for a time the streams of barbarian invasion. The decline of the Empire saw them surging on again. The Germans repeated the history of Ariovistus and his hordes. They settled first in the elbow of the Rhine, like the Allemanni and the Burgundi, then moved across the river and through the Burgundian Gate into the Doubs and Saône valleys. Others followed the course of the Cimbri, moved westward by the Belgian plain to the Meuse and then up its valley to the Saône passes. In the fifth and early sixth century the Burgundians occupied all the old Sequanian and much of the Æduan territory; in fact all the basin of the Saône and middle Rhone. There, strong in their strategic location, their mountain barrier, and their geographic unity, they maintained themselves as an independent kingdom for nearly a hundred years, till in 534 they were conquered by the Franks.²

The expansion of the Frankish tribes from their base in the northern plains of Gaul is instructive from the geographical standpoint. They swung around to the west of the Cevennes Plateau and in 511, by the conquest of nearly all Aquitaine from the West Goths, they pushed their boundary up the Garonne Valley to the Gap of Carcassonne; sweeping also down the Rhone Valley, they forced their frontier toward the Mediterranean as far as Orange, where the Cimbri had defeated the Romans. But they were still shut out from the Mediterranean. That old coastal belt between the Maritime Alps and the Pyrenees, which expanding Rome had first detached from Celtic Gaul, was still detached from this young Frankish Gaul. Provence, that earliest *provincia romana* of the Mediterranean seaboard and the Durance Valley, formed an arm of that East Gothic kingdom of Theodoric. The rest of the coastal strip between

¹ Caesar *op. cit.* i. 31-54.

² Hodgkin, T.: *op. cit.*, III, 357-58, 592.

the Rhone Delta and the Pyrenees, called Septimania or Gothia, formed a similar arm, which the Spanish kingdom of the West Goths thrust out to grasp hands as it were across the turbid current of the Rhone with its brother nation and overlord of the Italian peninsula. Thus these twin Gothic kingdoms were geographically the exact successors of Rome in 100 B.C. when it had united Italy and Spain.¹ The coastal strip of Mediterranean Gaul was the link between.

The link was too frail to resist the seaward expansion of the Frankish kingdom. It gave way in Provence, which was annexed to the dominion of Clovis in 536. Those interlacing headstreams along the granitic highlands of the Vosges and Cevennes, knitting together the river valleys of France, rounded out to its logical limits the territory of that first great imperial expansionist of the North Germans. Septimania, held by the eastern Pyrenean passes, remained part of the Spanish kingdom of the West Goths till 719, when it became part of the Spanish caliphate of the Saracens, and so continued with a few intermissions till 797. Again the Pyrenean Gap and the Rhone Valley were historically linked. During the Saracen conquest of Spain, Christian refugees fled across the eastern Pyrenees to the protection of this transmontane province of Septimania, and spread their Catalan Spanish speech as far as the Courbières Range, on whose last low shelf stands Narbonne above the alluvial flats of the Aude River. Their respite was short; their asylum wall too low. In a few years reconnoitering bands of Saracens sought out the eastern passes of the Pyrenees. Then came a great Saracen army in 719, and captured and fortified Narbonne as a base for future campaigns; Narbonne, which the Romans had built to command the Gap of Carcassonne and the coast road to the Rhone.² Defeated in their attempts to conquer Aquitaine, the Saracens turned toward the Rhone. They took Avignon in 730. For a few years Nîmes and Arles were in their power; but even in that short period they injected new life into the Rhone Valley commerce, kept their merchantmen hovering about the coast, and made their profit as the sea traders of Arabian Yemen have known how to do ever since; in rafts and dugouts they crossed the Strait of Bab-el-Mandeb to the market land of Punt and brought back Indian pearls and jewels to deck their Queen of Sheba. The outpoured flood of conquest which spread from Arabia to the Pyrenees had now spent itself. The occupation of Southern Gaul was the last weak lapping of the tide before the ebb. Narbonne was captured from the Saracens in 752 by Pepin le Bref; but it had to be retaken in 797, and finally was embodied in the domain of Charlemagne. At the same time (777-801), the Emperor advanced his frontier over the southern slope of the Pyrenees and occupied the Spanish March as an outpost against the Saracens.³ Thus he restored the old union of Northeastern Spain with

¹ Freeman, E. A.: *op. cit.*, 121-23.

² Coppee, H.: *History of the Moors in Spain* (Boston, 1881), I, 418-22; II, 17.

³ Freeman, E. A.: *op. cit.*, 125.

the coastal province Septimania, and repeated the history of Massiliot Gaul.

The threefold division of the Carolingian Empire by the treaty of Verdun (843) is explicable only in the light of the Rhone Valley breach. This geographical fact is the key to what otherwise appears to be an arbitrary and erratic allotment of the territory to the three heirs. The division left to Charles the major part of what we are wont to call France, or the kingdom of the West Franks; to Louis, the kingdom of the East Franks, which might be called the big nucleus of modern Germany; to Lothair it gave Italy and "a long narrow strip of territory between the dominions of his Eastern and Western brothers," Freeman states, and then adds in explanation: "Between these two states the policy of the ninth century instinctively put a barrier."¹

Geography admits no place for instinct in its interpretation of history. It looks for concrete and tangible causes. In this particular case it observes that the problematical strip of Lothair's territory comprised the whole Rhone-Saône-Doubs Valley, the Burgundian Gate with the elbow of the Rhine, the two northern passes of the hill country of the Monts Faucilles and Mont des Fourches to the Moselle and the Meuse, all the country drained by these two rivers, and the valley of the Rhine below the confluence of the Moselle at Coblenz. In other words, Lothair, to compensate himself for the small territory of Northern and Central Italy, demanded the whole stretch of that natural transit belt which crossed Europe from Marseilles northward to Cologne, Aix, and the mouths of the Rhine, the Meuse, and the Scheldt. This he held in its entirety except at two points. The West Frankish kingdom retained the Langres Pass, where the original Roman road had crossed the watershed; and it also thrust its frontier across the Saône at Chalon-sur-Saône in order to keep the important valley terminus of the ancient Æduran and Roman highway down from Autun. But Lothair's strip, in compensation, bent sharply west from Lyons far up on the Cevennes Plateau, in order to include the city of Roanne (Rodumna) on the Loire, the terminus of the old Roman road which ran west to Bordeaux on the Garonne estuary. Though all these ancient Roman highways had undoubtedly degenerated into mere tracks, they still sufficed to direct the commerce of the Middle Ages.

A traffic zone hardly furnishes a sound basis for a political territory, though it may yield a generous revenue. This transit strip constituting the continental part of Lothair's kingdom proved its artificial character by its rapid dissolution.² The northern half, comprising the valleys of the Meuse, the Moselle, and the Rhine, was absorbed by the East Frankish kingdom. Out of the remaining ruins emerged once more, in 887, the independent kingdom of Burgundy, a geographical unit with natural boundaries of mountain and sea to protect its frontiers; with the Rhone-Saône-Doubs

¹ Freeman, E. A.: *op. cit.*, 140.

² Lavis: *Histoire de France* (Paris, 1901), II, Part II, 4.

System penetrating every part of its area, like a great artery, to unify its national life; with the control of the Burgundian Gate, the northern passes, and the Alpine coast road to Italy, to give it weight in the political councils of Western Europe. Its strategic location tended to compensate for its lack of area. It stood in the center of the balance and could throw its weight on one side or the other. Through this power it was able to maintain its independence till 1032, when it became a fief of the German Empire. Then the whole stretch of the Rhone-Rhine groove was politically united. The influence of the through commerce is indicated by the rise here of numerous free cities, Besançon, Lyons, Orange, Arles, and Marseilles, which controlled all the foci of trade till the fourteenth century, and maintained the importance of this vassal state of Burgundy. Until 1365 the mediaeval German kaiser went to Arles to be crowned king of Burgundy as he went to Rome to be crowned emperor of the Holy Roman Empire.

The later history of Burgundy recites the gradual absorption of this "middle kingdom," as the old chronicles called it, by the modern kingdom of France. Early in the fourteenth century its voracious western neighbor began to gnaw at its western frontier, taking a bite here and there, till by 1378 it had swallowed up the southern Rhone Valley from the Mediterranean to Lyons. The northern part of Burgundy, which was more closely linked with Germany through the Burgundian Gate and the Lorraine passes, was able longer to resist French expansion. Nevertheless, in another hundred years, by 1477, it had shrunk to the free county of Burgundy or the Franche Comté, a small territory comprising the valleys of the upper Saône and Doubs, which passed to France in the conquest of Louis XIV.¹

The Rhone Valley breach opened a path of conquest for the military Franks from the north to the coast provinces of Languedoc and Provence, just as later it facilitated the expansion of the French kingdom to the Mediterranean coast and enabled it to round out its territory to its natural frontier. The breach has given to this stretch of coast a unique importance as the only littoral in the western Mediterranean that commands easy connection with a continental hinterland, and as the southern outlet of a great plexus of northern land routes.

Marseilles, which has long overshadowed its mediaeval rival Arles, is the only seaport of the Rhone Valley. It has therefore concentrated upon itself all the exports of Northwestern Europe which seek the market of Africa, the Levant, Eastern Asia, and Australia; it gathers in return the wheat of Russia, the oil seeds of India and Africa, the wines and dried fruits of the Mediterranean, the teas and spices of the Far East.² The variety of products from distant sources which pass through the harbor of Marseilles is symbolic of the peoples, tongues, and civilizations that have moved along the Rhone Valley thoroughfare since the dawn of history.

¹ Freeman, E. A.: *op. cit.*, 141, 148, 150, 194; map plates, XVIII-XXV.

² Chisholm, George G.: *Compendium of the Geography of Europe* (London, 1899), I, 429.

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PIRATE COASTS OF THE MEDITERRANEAN SEA*

By ELLEN CHURCHILL SEMPLE

It is rather a significant parallel that the German and Austrian submarines, the commerce destroyers of the present war, frequent the same hunting-grounds in the Mediterranean as the ancient and mediaeval corsairs. They have been operating in the Iberian Sea, which forms the broad avenue leading to the Gibraltar gate; along the marine highway between Spain and the Balearic Isles, traveled by ships bound from Gibraltar to Marseilles; in and about the Sicilian Strait, where converge all lines of traffic between the eastern and the western basins; in the Strait of Otranto and the long Adriatic lane; in Cretan waters, which form the passways to the Aegean; and along the approaches to Alexandria and the Suez Isthmus.

The Mediterranean Sea has been the oldest and in some respects the greatest European training school of maritime activities. These it has coddled and guided and stimulated by a rare combination of geographic conditions. From time immemorial its coasts have sent out fishing fleets into all parts of the basin. From the days of the Cretan Minos it has produced a long succession of sea powers whose navies have sailed its waters far and wide and whose merchantmen have traded in its remotest ports.

A sinister form of maritime activity is found in the piracy which for ages was a recurrent phenomenon on many shores of the Mediterranean. It constituted a lawless combination of naval aggression and maritime commerce, seizure and sale without the formality of purchase. The blend of piracy and trade among early Phoenicians, Greeks, and Etruscans belonged to a primitive, undeveloped period when warfare was chronic, when stranger meant enemy, and when buccaneers executed a crude form of navigation act designed to crush competition in the markets of the home sea. Such undoubtedly was the attitude of the ancient Etruscan pirates toward Greek and Carthaginian ships which ventured to sail the Tyrrhenian Sea. They asserted the priority of their claim to those waters by attacking the coast and island settlements of the Greeks in the vicinity, with the purpose of discouraging encroachments upon their maritime preserves.¹ Piratical attacks were especially common in the Aegean when many of the Cyclades islands were occupied by Carians and perhaps by Phoenicians, and when national antagonisms emphasized commercial rivalry on the sea. Finally the Cretan Minos employed his naval power to conquer these islands, suppress piracy, and protect the revenues from his maritime empire, so that commerce by sea became more general.²

The decay of Cretan sea power after the Dorian invasion made possible

* A chapter from a forthcoming book on "Geographic Influences in the Ancient Mediterranean Basin."

¹ Mommsen: *History of Rome*, Vol. I, pp. 181-182 and 186. New York, 1905.

² Thucydides, I, 4-8.

the revival of piracy in Homeric times,³ and converted the former police of the Aegean into wide-ranging corsairs. A passage in the *Odyssey* indicates that it was not an uncommon event for Cretan freebooters to carry off plunder from the Egyptian coast.⁴ Homer represents the Phoenicians as kidnapping men and women to sell as slaves. Taphian pirates, Greek natives of a small island group off the west coast of Acarnania, stole a Sidonian woman and sold her to a Syrian prince. Both Taphians and Cretans, in Homeric times, were more corsairs than traders, and both were skilful mariners.⁵ When seamen landed on a strange coast, they were asked, quite naturally: "Outlanders, whence come ye? Are ye robbers that rove the sea?" The general custom of slaying shipwrecked mariners,⁶ on the assumption of their being pirates, points to the prevalence of the evil in the Mediterranean in legendary and early historical times.

The conspicuous fact in Mediterranean piracy is its repeated recurrence whenever maritime political control is relaxed, and especially its constant recurrence, from the dawn of history down to the nineteenth century, in certain coast districts which are natural breeding places of sea-robbers. The stable factors tending constantly to produce this phenomenon are to be found in the geographic conditions obtaining in the Mediterranean. Owing to the configuration of the basin, traffic was compressed into certain narrow trade routes. These threaded their way between island and peninsula, entered sub-basins by the only possible gateway of the strait, and, when bent upon tapping the hinterland trade, concentrated on ports like Massilia and Alexandria, commanding the few breaches in the barrier boundaries of the Mediterranean. Thus traffic was restricted to fixed lines in a way impossible on the open ocean.

The sea hunter, therefore, knew various points where he was sure to bag his game. The pirate was the robber of the sea highways; and the highways of the Mediterranean were well defined and well traveled. The Oriental commerce in slaves and luxuries yielded such rich plunder to the freebooters, as it passed through Cretan waters between the Peloponnesus and Cyrenaica, that the pirates called this "the golden sea."⁷ Just such geographically determined routes attracted the buccaneers of the American Mediterranean in the seventeenth century, as they swarmed out of their hiding places in the Antilles, to seize the gold and silver freight of the homebound Spanish caravels or the useful cargoes of the outbound ships. Here Jamaica, owing to its location, played the part of Crete as an advantageous piratical base; for it commanded several marine passages into the Caribbean Sea and was within striking distance of the Spanish treasure ships as they left the Isthmus of Panama and the Mexican ports.⁸

³ Keller: *Homeric Society*, pp. 92-93. New York, 1902.

⁴ *Odyssey*, XIV, 245 *et seq.*

⁵ *Odyssey*, I, 181-185, XV, 426; XVI, 426; Strabo, Bk. X, Ch. II, 20; Herodotus, I, 2.

⁶ Herodotus, IV, 103; Strabo, Bk. XVII, Ch. I, 6, 19.; Vergil: *Aeneid*, III.

⁷ Mommsen: *History of Rome*, Vol. IV, p. 309. New York, 1905.

⁸ David Hanney: *The Sea Trader*, pp. 234 and 244. Boston, 1912.

The Mediterranean afforded a profitable field for the pirate, furthermore, because the wealth of the bordering lands lay within reach of his pillaging expeditions ashore. Owing to the prevailing rugged relief, the consequent paucity of land roads, the importance of "the wet ways" for communication and transportation, the scarcity of level land for cultivation, and the general discouragement of the barrier boundaries to inland expansion, population was concentrated on the coastal hems and small deltaic plains near the sea. Piratical raids upon these littoral communities forced the very early inhabitants of Greece, Thucydides tells us, to locate their cities from two to ten miles back from the shore.⁹ Farther than this the pirates dared not penetrate, lest their escape should be cut off. The location on the inner edge of the coastal zone characterized not only the most ancient Greek cities, like Athens, Argos, Tiryns, Mycenae, Megara, and Corinth, but also the earliest Cretan towns and palaces of the Minoan period, such as Cnossus, Phaestus, Gortyna, Lyttus, and Praesus. These lay several miles back from the shore where each maintained a port or naval arsenal.¹⁰

The same cause and effect are manifest also in the western Mediterranean. The Etruscans, owing to their nautical efficiency, might have risked coastal settlements; yet as a matter of fact they placed their earliest towns several miles from the shore. Such was the location of Pisa, twenty stadia up the course of the Arno, which even in historical times was exposed to robber raids from Sardinia.¹¹ Such was that of Vetulonium, Volci, Caere, and Tarquinii on the Tyrrhenian littoral, as well as Spina and Atria, their Adriatic ports.¹² Strabo makes the generalization that the founders of the early Etruscan cities, as opposed to later ones, either avoided the coast or merely built fortifications there as defenses against pirates. The only exception which he found to this rule was Populonia (Piombino), located on the walled summit of a lofty promontory, with its little port on the inlet at the base.¹³ But this possibly was no exception after all, for Populonia may have been originally one of the earliest Greek factories which temporarily occupied several capes and islands of the Etruscan coast, until their occupants were dispossessed by the native inhabitants.¹⁴

The necessity of occupying these salient points as coast defenses against the maritime Greeks, and their own growing sea power, drew the Etruscans coastward. They occupied also the promontories of Antium, Circei, and Surrentum on the coast of Latium and Campania and utilized them as pirate strongholds from which to conduct their depredations.¹⁵ Fearing these attacks, the agricultural Latins located their most ancient villages at

⁹ Thucydides, I, 7.

¹⁰ Strabo, Bk. X, Ch. IV, 7, 11-14.

¹¹ Strabo, Bk. V, Ch. II, 5, 7.

¹² Mommsen: *History of Rome*, Vol. I, pp. 160-161, 179. New York, 1905. Pliny: *Natural History*, III, 20.

¹³ Strabo, Bk. V, Ch. II, 6.

¹⁴ Mommsen: *History of Rome*, Vol. I, pp. 177-178. New York, 1905.

¹⁵ *Ibid.*, Vol. I, p. 181.

a respectful distance from the sea, even those like Lavinium, Laurentum, and the Rutulian Ardea, which belonged to the coastal zone.¹⁶

With the general development of maritime activity in the Mediterranean, the consequent decrease of piracy and increase of oversea colonization, sites on the outer edge of the littoral were selected for their ready access to commerce. Such of the older towns as were not too far from the seaboard established there each its own port. Thus there developed twin cities, port and capital, such as Rome and Ostia, Troezen and Pogon,¹⁷ Athens and the Piraeus, Gortyna and Leben in Crete,¹⁸ Cythera and Scandia in the island of Cythera,¹⁹ and countless other primitive towns of inland location. Many of these felt the necessity of securing their connection with the sea against interruption in time of war and therefore built "long walls" like those which enclosed the thoroughfare between Athens and the Piraeus. Similar "long walls" connected Megara with its port of Nisaea²⁰ on the Saronic Gulf, Corinth with its port of Lechaëum on the Corinthian Gulf,²¹ and were projected by Argos to ensure its communication with the sea at Nauplia in the Peloponnesian War, but when half finished were destroyed by the Spartans.²²

The decline of Roman sea power in the last decades of the Republic led to a widespread recrudescence of piracy. The freebooters were emboldened to seize many coast towns and to carry their pillaging expeditions farther inland than ever before. Therefore the Gabinian Law, enacted in 67 B. C. for the suppression of piracy, conferred upon Pompey the dictatorship over the sea and over a coastal zone fifty miles wide, in order to include all the seaboard holdings and the inland refuges of the pirates.

The coastal population which was drawn shoreward when the seas were safe from marauders retreated anew to the interior on the revival of the buccaneer's trade. Thus the southern littoral of Italy, which was the site of flourishing seaboard settlements during the period of Greek colonial expansion, became wellnigh depopulated during the Middle Ages, owing to the century-long attacks of the Vandal, Saracen, and Algerine pirates,²³ who swooped down from the African coast, and the depredations of the Dalmatian corsairs, who issued from their haunts in the nearby Adriatic. Any one who has traveled along the seaboard railroad of southern Italy is familiar with the lonely little stations and the accompanying *marina*, or landing place, on the shore, while the unseen towns lie three to ten miles inland on acropolis sites in the mountains.²⁴ The same shifting of popula-

¹⁶ Strabo, Bk. V, Ch. III, 2, 5.

¹⁷ Strabo, Bk. VIII, Ch. VI, 14.

¹⁸ Strabo, Bk. X, Ch. IV, 7, 11.

¹⁹ Pausanias, Bk. III, Ch. XXIII, 1.

²⁰ Thucydides, I, 103.

²¹ Strabo, Bk. VIII, Ch. VI, 22.

²² Thucydides, V, 82-83.

²³ Norman Douglas: *Old Calabria*, pp. 135-140. Boston, 1915.

²⁴ Baedeker: *Southern Italy*, pp. 221-222, 225-228. Leipzig, 1903.

tion has occurred on other seas where pirates have flourished. The German city of Lübeck was originally located nearer the sea than at present; but after it had been frequently demolished by the pirates who scoured the Baltic coast in the Middle Ages, it was rebuilt farther inland up the Trave River. Gradually, with the return of security, it built up its port of Travemünde at the mouth of the estuary.²⁵

Thus geographic conditions made the Mediterranean basin a good hunting ground for the pirate. But they did more than this. They condemned certain districts of its coasts to be natural breeding places for corsairs and sent their inhabitants out upon the sea to earn an infamous livelihood. The fundamental geographic condition on these coasts is the same that makes for systematic robbery also in mountains and deserts, during their protracted centuries of backward economic development. The land yields only a scanty food supply, which must be eked out therefore by raids upon neighboring territories. The predatory expeditions of the mountaineers are directed against the agricultural plains at the foot of the highlands, as those of the ancient Alpine tribes against the lowland settlements of northern Italy. The son of the desert turns his raid against the river-valley farm lands, like those of the Libyan tribesmen against the neighboring Nile delta.²⁶ Where the unproductive area abuts upon the sea, like the Dalmatian or Caucasus coast, its people prey upon the nearest thoroughfares of maritime commerce, like the brigand on the mountain pass road, or pillage the nearest productive seaboard.

It is to be noted, moreover, that where mountain or desert tribes or steppe nomads make their way out to such coasts, they bring with them the mind of robbers and only alter their raiding method. They adapt themselves to the seaboard environment, blend with the local inhabitants, from whom they learn the art of navigation, and pursue their ancestral trade, exchanging the desert camel and steppe pony for the swift-moving ship. The mental habit of the previous habitat harmonizes with the economic conditions of the new one. This was true of the Illyrian pirates, whose highland brethren for centuries raided the frontiers of ancient Macedonia; it was true of the desert-bred Saracens wherever they touched the Mediterranean coasts, though their inland settlements were models of careful tillage and thriving industries; it was true of the ancient nomad Scythians²⁷ and later of the nomad Tatars when they settled on the Black Sea shore, and of the Zaporagian Cossacks of the Russian steppes, who in the seventeenth century put out from the Dnieper estuary in their frail skiffs to ravage the Turkish coasts.²⁸

²⁵ R. Reinhard: *Die wichtigsten deutschen Seehandelstädte*, p. 23. Stuttgart, 1901.

²⁶ For the general principles, see Friedrich Ratzel: *Anthropogeographie*, Vol. I, pp. 154 and 435, Stuttgart, 1899, and E. C. Semple: *Influences of Geographic Environment*, pp. 234-235, 490-496, 553-554, 586-591. New York, 1911.

²⁷ Strabo, Bk. VII, Ch. IV, 2. 6.

²⁸ For vivid description, see Gogol's novel "Taras Bulba," translated by Isabel Hapgood.

Like a natural product of the soil, pirates were a constant or recurrent phenomenon on the whole southern coast of Asia Minor, comprising ancient Lycia, Pamphylia, and Cilicia;²⁹ on the rugged littoral of Clazomenae peninsula of Asia Minor, where Mount Corycus rises abruptly from the sea;³⁰ in many Aegean islands and especially Crete; on the forbidding Caucasus coast of the Euxine where all geographical conditions were hostile to civilization;³¹ on the Illyrian or Dalmatian coast of the Adriatic; on the Atlas-walled front of the African shore, the so-called Barbary coast; and in the Balearic Archipelago and Corsica.

All these districts, whether on islands, peninsulas, or continental shores, have in common certain geographic conditions which combined to force or lure the inhabitants into a piratical mode of life. So soon as war interrupted their few regular industries, or a corrupt government failed to hold them under restraint, or the maritime powers which policed the Mediterranean became weak or disorganized, these regions flashed into piracy. They were all mountainous coasts, broken up into isolated coves and valleys in which a strong centralized government was next to impossible, and endowed with little alluvial land. Natural conditions reduced tillage to a minimum and prevented the concentration of population necessary for local industries as a basis for commerce. The islands suffered always from the handicap of limited land, and therefore were more addicted to piracy, Thucydides tells us, than the continents. Samos, only 182 square miles in area, laid the financial and naval foundations of its great power under Polycrates (532-522 B. C.) by a long career of piracy. Its penteconters cruised the Aegean, plundering Greek and barbarian alike, levying blackmail for safe conduct. After the tyrant had made his fleet supreme on the sea, he organized the coasts and islands into a maritime confederation of wide extent; but the restless Samians easily reverted to their freebooting activities when opportunity arose.³² Crete, though it was a large island and had a fertile maritime plain of some extent at the northern base of its long mountain range, gave evidence of a constant food problem. Like mountainous Arcadia and Aetolia, in order to reduce the pressure of population upon the limits of subsistence, it became a standing source for mercenary troops in the ancient Mediterranean,³³ when a strong hand kept order on the sea. When the hand was removed, Crete became a chronic source of pirates. On these, as on other islands, human life has resorted to crime in order to equalize population and food supply.³⁴

On the rugged continental coasts of the Mediterranean, the mountains

²⁹ Strabo, Bk. IV, Ch. V, 1, 2, 3, 6.

³⁰ Strabo, Bk. XIV, Ch. I, 35. Livius: *Historia*, XXXVII, 27.

³¹ Strabo, Bk. XI, Ch. II, 12, 15.

³² Herodotus, III, 39, 47, 57-59. Ernst Curtius: *History of Greece*, Vol. II, pp. 161-162, 170 and 212. New York, 1871.

³³ Thucydides, VI, 25, 43; VII, 67. Polybius, II, 66; III, 75; V, 13, 14, 65, 79; XIII, 6; XXXI, 26; XXXIII, 16.

³⁴ E. C. Semple: *Influences of Geographic Environment*, pp. 67 and 461-465. New York, 1911.

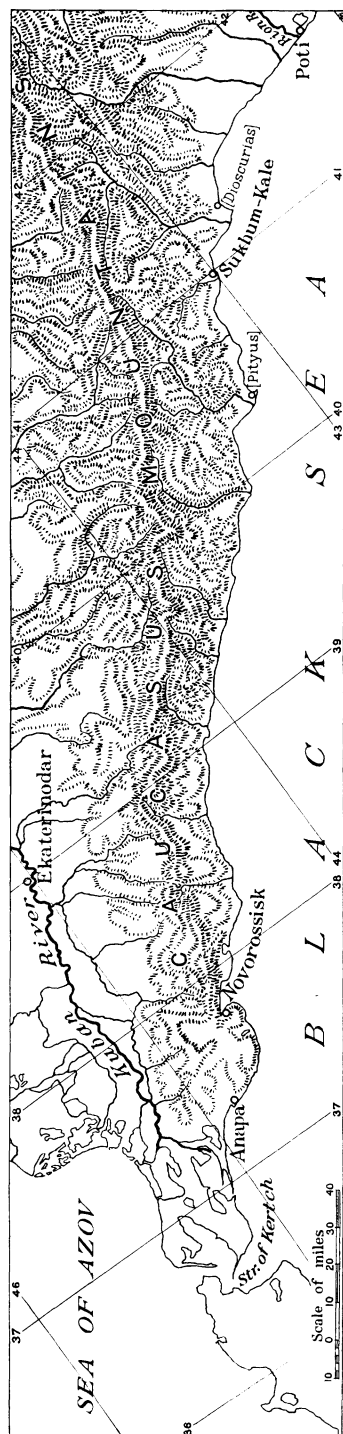


Fig. 1.—The Caucasus coast of the Black Sea. Scale, 1:13,000,000. (Ancient names in hair-line type.)

provided timber for ships, but seriously impeded communication with the hinterland. Moreover, that hinterland was undeveloped on account of the mountain barrier, as in the case of the Illyrian interior; or unproductive on account of an arid climate, as in the case of the Cilician, Caucasus, and Atlas back-country. Hence it furnished no incentive for the commercial development of the littoral. This was the condition which for centuries made the Malabar coast of India and the Norwegian fiords nests of pirates. The Lebanon country had all the geographic conditions necessary for a pirate coast, with one exception. Trade here was more profitable than piracy, owing to the rich commerce from the Euphrates fords and the desert market of Damascus which forced its way through the mountain passes to the sea. But in Pompey's time, after two centuries of nerveless Seleucid rule in Syria, after the disorganization of the hinterland trade by the successive Armenian and Parthian conquest of northern Mesopotamia, and the diversion of the through Oriental commerce to the Red Sea and Nile route, robber chiefs held many coast cities of Phoenicia and made them pirate bases.³⁵ Joppa became a notorious haunt, and for this reason was destroyed by Vespasian in 68 A. D.³⁶

The normal relation of coast to hinterland is a close interdependence. But in ancient times when the hinterland was impoverished and barred from the sea, and when the littoral itself afforded a slender basis of subsistence, the inhabitants of the seaboard were forced to live by a carrying trade under peaceful conditions, or by piracy, if the unorganized or dis-

³⁵ Mommsen: *History of Rome*, Vol. IV, pp. 423-424 and 430. New York, 1905.

³⁶ Strabo, Bk. XVI, Ch. II, 28. G. Adam Smith: *Geography of the Holy Land*, p. 138. New York, 1897.

organized state of society so permitted. The balance was easily disturbed and tipped from trade to freebooting at any jar to the social base.

Another common geographic condition was a multiplicity of small harbors and hidden recesses as lurking places for the robber fleets, with numerous headlands as outlook points and strongholds. In this respect the Aegean archipelagoes, the Balearic Isles, and the Illyrian coast were best equipped, because the maze of straits and inlets facilitated escape from pursuit. In this respect they resembled the Bahama Islands off the Florida coast,³⁷ which were long the hiding place of pirates operating about the Florida Straits and the Windward Passage. They offered the same geographic conditions as the network of sounds and creeks, deposit islands and barrier beaches, forming the embayed coast of North Carolina; there for over a century American pirates lay in wait for merchantmen trading along the coast between the West Indies and New England and did their best to nullify the effects of the obnoxious Navigation Acts.³⁸ Crete, like Cuba and Jamaica, had an admirable coastline for piratical purposes and nearby island-strewn seas in which its corsairs could safely operate. Lycia, Pamphylia, and Rugged Cilicia (Cilicia Trachea) had an abundance of small hidden ports and rock fortresses³⁹ but lacked the sheltering islands.

The Caucasus coast of the Euxine (Fig. 1) had nothing to recommend it for piratical purposes, except its poverty of resources and its ship-building timber. Its harbors were very few and badly exposed to the prevailing winds. It had no islands and for long stretches not even a beach. The Caucasus buccaneers, when they returned in autumn from their marauding expeditions, lifted their slender *camarae*, or boats, on their shoulders and hid them in the mountain forest until spring again opened their business season.⁴⁰

All these pirate coasts lay on established trade routes. The robber fleets of the Caucasus swooped down upon the well-laden Greek ships making their usual coastwise voyage to the ports of the Crimean Bosphorus, there to exchange wines and cloth for grain and cattle. In the third Mithradatic War, the Pontic corsairs who joined the fleet of the Asiatic king were doubtless recruited in part from this mountainous coast; for thither retreated the last remnants of the pirate bands who, for two years, withstood a Roman siege in Amisus, Sinope, and Heraclea on the seaboard of Asia Minor.⁴¹ During the time of Emperor Tiberius, we find the pirates from this east coast of the Euxine preying upon commerce and pillaging towns and villages of the surrounding lands. They were later reinforced by Scythian corsairs from the Dniester estuary, and in the third century these

³⁷ David Hanney: *The Sea Trader*, p. 234. Boston, 1912.

³⁸ S. C. Hughson: *Carolina Pirates and Colonial Commerce, 1670-1740*. Baltimore, 1894.

³⁹ Strabo, Bk. IV, Ch. V, 1, 2, 3.

⁴⁰ Strabo, Bk. XI, Ch. II, 12.

⁴¹ Mommsen: *History of Rome*, Vol. IV, pp. 333-335. New York, 1905.

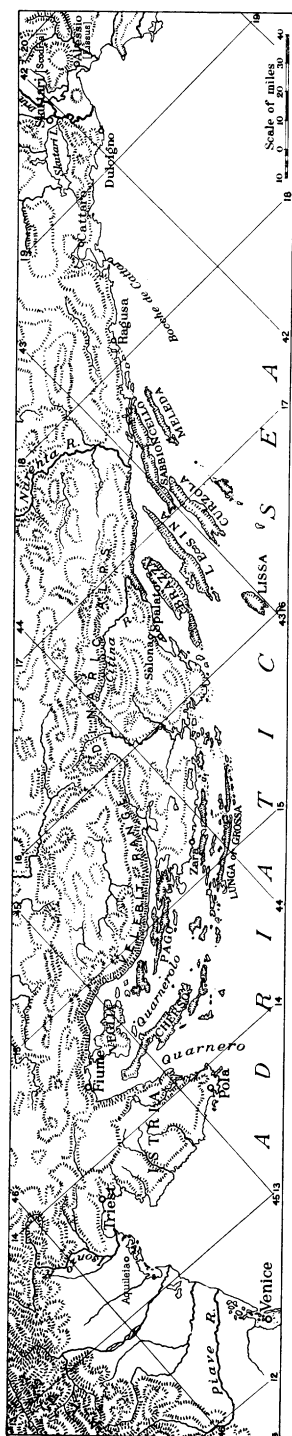


FIG. 2.—The Dalmatian coast of the Adriatic. Scale, 1:4,000,000. (Ancient names in half-line type.)

"*Scythicarum gentium catervae*" ravaged the shores of the Propontis and Aegean.⁴² The Romans had two lonely stations, Dioscurias and Pityus, on the best harbors this Caucasus littoral could offer; and their remote outpost situation strongly suggests that they were designed to police this lawless coast.

In the Middle Ages the Caucasus pirates were still plying their ancestral trade, though their stock had probably received an infusion of fresh Tatar blood. This time they were looting the richly freighted caravels bound for the Genoese colonies in the Crimea. And again, in the eighteenth and early nineteenth centuries, they issued forth in their poor barks and seized any Turkish or Russian vessels which approached their shores.⁴³ Hence, Genoa, at some remote date, established a fort at Anapa on this coast for the protection of her commerce. Centuries later, on the ruins of this Genoese stronghold, the Turks built a fort in 1783, and transferred it to the Russians in 1828.⁴⁴

The Aegean pirates, when anarchy reigned on the seas, waylaid ships at the various crossroads of that much-traveled basin in ancient and mediaeval times. The pirate-haunted coast of southern Asia Minor flanked the great Oriental trade track which skirted along this shore and ran thence westward past Rhodes, Crete, and Cythera. These islands afforded choice bases for depredations upon the eastern commerce and also upon the traffic passing in and out of the Aegean. Rhodes, however, seems always to have had both a firm, enlightened government and a strong fleet. Hence, she repeatedly fought the pirates on her own account and supported

⁴² Mommsen: *Provinces of the Roman Empire*, Vol. I, pp. 262-263. New York, 1887.

⁴³ Chevalier Marigny: *Three Voyages in the Black Sea to the Coast of Circassia*, pp. 9-10. London, 1837. Translated from the French.

⁴⁴ *Blackwoods Magazine*, Vol. 42, 1837, p. 642.

Rome in its efforts to suppress the evil. Cythera was long a depot of Phoenician pirates. Crete, though its Minoan kings enjoyed the distinction of being the first to put down piracy in the Aegean, became a nest of freebooters so soon as the decline of Greek naval power brought disorder upon the sea.⁴⁵ Finally, the extent and flagrancy of their depredations, in co-operation with the Cilician pirates, forced Rome, in 67 B. C., to conquer and annex the island as a police measure. Crete in Saracen hands, from 823 to 960 A. D., again became a formidable nest of corsairs and a great slave market.⁴⁶ But the location which made it a desirable pirate base also made it for over four centuries, from 1206 to 1669, the most important commercial base of Venice in eastern waters.

Pompey's famous campaign of 64 B. C. was directed against the pirates who, for nearly forty years (102 to 64 B. C.), had terrorized the Mediterranean, organizing themselves into an international sea power for robbery which embraced the whole basin. They so effectually stopped traffic that dreadful scarcity of provisions prevailed in Italy and especially in Rome, which had come to rely on her oversea grain supply. The buccaneers had their ports of refuge on all the chronic pirate coasts of the Mediterranean from Mauretania to Cilicia, but the latter was their acropolis.⁴⁷ Nature had equipped it with every physical facility for the trade—timber, harbors, signal stations, coast fortresses, impregnable mountain retreats.⁴⁸ Moreover, its location, remote and inaccessible from the weak Seleucid capital, had placed it beyond reach of the arm of authority and left its people free to follow their marauding bent. Hence the Cilician sea chiefs were the last to hold out against Pompey, and his strong repressive measures against piracy produced here only temporary results. The corsairs of Cilicia resumed activities in the early years of Augustus. One of their tribes, the Clitae, necessitated a Roman punitive expedition in 36 A. D. and again in 52 A. D. In the third century the Cilician pirates emerged as the Isaurians, who from the Cilician mountains plundered on land and sea.⁴⁹

The Adriatic furnished a convenient thoroughfare for piratical operations. Throughout ancient and mediaeval times the rich commerce which traversed this broad marine channel, to and from the ports about the Po mouth, had to run the gauntlet of Illyrian or Dalmatian pirates, whose haunts flanked the sea for four hundred miles (Fig. 2). These freebooters also pillaged vessels sailing across the basin from Italy and ravaged the western coasts of Greece from Epirus to Messina. When their sovereign, Queen Teuta of Scodra, or Scutari, provoked the Romans to punitive operations in 230 B. C., the Illyrian pirates could send out a fleet of a hundred vessels equipped with a force of five thousand men. This first effort of the

⁴⁵ Polybius, XIII, 8. Mommsen: *History of Rome*, Vol. III, pp. 291-292. New York, 1905.

⁴⁶ Gibbon: *Decline and Fall of the Roman Empire*, Vol. VI, pp. 37-38, 46, and 57. New York, 1907.

⁴⁷ Mommsen: *History of Rome*, Vol. III, p. 292; Vol. IV, pp. 307-312, 351-355, and 301-302.

⁴⁸ Strabo, Bk. IV, Ch. V, 1-6.

⁴⁹ Mommsen: *Provinces of the Roman Empire*, Vol. I, pp. 363-365. New York, 1887.

Romans to police the Adriatic resulted in the escape of Queen Teuta to Rhizon (Resine) in the marine labyrinth of the Gulf of Cattaro,⁵⁰ now the impregnable naval base of modern Austria in these waters; but the treaty of peace excluded Illyrian raids from the southern part of the basin beyond Lissus (Alessio). Fifty years later the founding of Aquileia at the northern end of the Adriatic helped to suppress piracy on those shores.⁵¹ The significant result of Illyrian piracy in these waters was the first interference of Rome in affairs of the Balkan Peninsula, the establishment of Roman naval supremacy in the Adriatic, and the acquisition of certain islands and ports on its eastern shore⁵² which were valuable bases for the later extension of Roman power in Greece and Macedonia.

The Illyrian pirates still persisted in their depredations. The robber confederacy which had its capital at Scodra, like its brothers elsewhere in the Mediterranean, was open to engagements as a mercenary fleet. In this capacity it took part in the third Macedonian war against the Romans, and after the battle of Pydna, in 168 B. C., saw its fleet captured and its operations checked for a time. Soon its neighbors, the Dalmatian tribe of pirates, who held the littoral from the Narenta River northward beyond the Cetina, committed such widespread depredations that the Romans sent punitive expeditions against them in 156 B. C., again in 155 B. C. and again in 135 B. C.⁵³ This last drove the pirate population inland and made them settle in barren mountain valleys where they starved and pined away. But their old haunts on the sea were soon reoccupied by remnants of the tribe, probably reinforced by refugees and outlaws, because the Romans had to punish the Dalmatians again in 119 B. C.⁵⁴ In seventy years they so recouped their fortunes and extended their confederacy that, as allies of Pompey, they offered long-continued resistance to the fleets of Caesar sent against them.⁵⁵ After order was restored, Imperial Rome established on this coast, at Pola and Salona, her most important Adriatic naval stations, because the opposite Italian coast had no adequate harbors, and she drew from these former outlaw shores the marines to man the imperial navy, just as Austria does today.

The decline of Roman power during the *Völkerwanderung* was followed by insecurity of traffic on all Mediterranean routes. In the Adriatic especially, the growing Venetian commerce of the eighth and ninth centuries and the richly freighted vessels which traveled this long waterway furnished tempting booty for piratical attacks. Geographic conditions were unaltered on the mountainous and island-strewn coast of Dalmatia, but the original Illyrian population had been largely diluted, and at many points even

⁵⁰ Polybius, II, 5, 6, 8-12.

⁵¹ Mommsen: History of Rome, Vol. II, p. 372. New York, 1905.

⁵² *Ibid.*, Vol. II, pp. 218-9.

⁵³ *Ibid.*, Vol. II, pp. 437, 505, and 508-509; Vol. III, pp. 421-422 and 426-427.

⁵⁴ Strabo, Bk. VII, Ch. V, 4-6, 10.

⁵⁵ Mommsen: History of Rome, Vol. V, pp. 103-104, 235-236, 284-285. New York, 1905.

replaced, by the influx of Slavic Serbs and Croatians who poured down to this coast in the seventh century.⁵⁶ These interlopers, accustomed to the inland occupations of farming and cattle-herding, abandoned their ancestral callings and adapted themselves to their new environment. They learned from the surviving Illyrians the traditional trade of the coast, became the only expert navigators that the Slav race has ever turned out, and developed buccaneering aptitudes that would have elicited the admiration of old Queen Teuta. Therefore, when the Venetian galleys proved worthy prizes, this new race of freebooters issued from the old pirate haunts at the mouth of the Narenta and along the whole Dalmatian coast. The task of policing the Adriatic against the marauders began in 827 and continued without interruption till the end of the eighteenth century; because the richer grew Venetian trade, the greater was the temptation which it offered to the corsairs.⁵⁷

At first the Venetian fleets were too weak to make effective resistance. They seized pirate ships, to be sure, and carried the Slav captives in such numbers to Venice to be sold as slaves that the race name became the common term for human chattels in western Mediterranean lands; but only a large navy and systematic campaigns against the pirates could remedy the evil. The increased armament necessary for coping with the marauders undoubtedly contributed greatly to the development of Venetian sea power both within and without the Adriatic.⁵⁸ Moreover, the necessity of protecting Istria from depredations led finally to Venetian supremacy in that peninsula, while the yet stronger necessity of cleaning out the corsair nests on the whole Dalmatian coastland led to the conquest and annexation of the littoral in 998. This move was imperative, because the pirates had adopted the method of the ancient Illyrians and hired themselves out as a mercenary fleet to the enemies of Venice, who thus found a convenient base in the Adriatic.⁵⁹

But the conquest of Dalmatia did not bring immunity to the Republic. The neck of the Adriatic bottle continued to send forth a stream of wealth that attracted sea-robbers from all parts of the Mediterranean. From 860 to 912, year after year, Saracen corsairs were hanging about the narrow Strait of Otranto.⁶⁰ A famous Genoese corsair seized Corfu for a short period as a convenient base, till it was wrested from him by Venice in 1206.⁶¹ After this, in the late thirteenth and during the entire fourteenth century the possession of all the Ionian Islands, which occupied a strategic position near the Otranto gate, was disputed by Venetians and by Greek and Italian corsairs. From this base they ventured into the lower Adriatic

⁵⁶ W. Z. Ripley: *Races of Europe*, pp. 404, 410-414. New York, 1889.

E. W. Freeman: *Historical Geography of Europe*, p. 118. London, 1882.

⁵⁷ W. C. Hazlitt: *The Venetian Republic*, Vol. I, p. 60. London, 1900.

⁵⁸ W. R. Thayer: *Short History of Venice*, pp. 30-35. New York, 1905.

⁵⁹ W. C. Hazlitt: *The Venetian Republic*, Vol. I, pp. 78 and 106-109. London, 1900.

⁶⁰ *Ibid.*, Vol. I, p. 62.

⁶¹ Article "Ionian Islands," *Encycl. Britann.*, 11th edit., Vol. 14, 1910.

for their prey. The Republic maintained her command of the Adriatic only by means of a powerful patrol fleet, which policed the sea for pirates and vessels carrying contraband goods.⁶²

The decay of Venice, due to the Turkish conquest of Constantinople and the discovery of the sea route to India, was attended by a decline of her naval power which, from the sixteenth century on, enabled the Dalmatian coast population to resume their piracy. The Adriatic was also scourged by the Tunisian and Algerine corsairs, by Tuscan pirate ships fitted out with Corsican captain and crew, by Maltese Knights of St. John and Florentine Knights of St. Stephen who turned sea-robbers, and even by subjects of the Papal States.⁶³ With the Barbary and Dalmatian pirates, Venice alternated between conflicts and treaties on a blackmail basis up to the last years of her existence as an independent state.

The appearance of Genoese and Tuscan corsairs during the Middle Ages in Adriatic waters looks like a recrudescence of the ancient piracy which emanated from the Etruscan and Ligurian coasts. Ancient Etruria lacked the essential geographic conditions for chronic piracy, owing to its fertile soil and varied relief; but its location conferred upon it control of the narrow channel of traffic between the islands of Elba and Corsica, and gave it ready access to the rich commerce passing through the Strait of Messina.⁶⁴ Undoubtedly this advantageous location, plus the desire to exclude Greek competition from the Tyrrhenian trade, contributed to the persistence of Etruscan piracy. In 482 B. C. we find Anaxilaus, tyrant of Rhegium and Zancle, fortifying the Scyllaeum promontory to prevent the Etruscan sea-robbers from passing through the Strait of Messina; and thirty years later Hiero of Syracuse, who had established his naval power in the Tyrrhenian Sea, sending forth an expedition to ravage the coast of Corsica and Etruria, and to occupy the island of Elba, in order effectually to suppress piracy.⁶⁵ The evil recurred sporadically, however, for over a century after this.

Corsica, by reason of its rugged relief, poor soil, indented coastline, and location on marine trade routes, had all the physical qualifications for chronic piracy. To these were added yet another. Its small geographical area, limited population, and political dismemberment, due to its physical dismemberment, all combined to weaken the island and make it a ready prey to every policy of expansion which emanated from the near mainland, whether from ancient Etruria, from Carthaginian, Vandal, or Saracen Africa, from Rome, Pisa, Genoa, or France. To all except the African states, the location of Corsica made it a constant menace if held by a hostile power. Hence, its football political experiences were the persistent result. The free spirit of the mountain islanders made them irreconcilable sub-

⁶² P. Molmenti: *Venice in the Middle Ages*, Vol. I, pp. 117, 121-123, and 130. Chicago, 1906.

⁶³ David Hanney: *The Sea Trader*, p. 253. Boston, 1912.

W. C. Hazlitt: *The Venetian Republic*, Vol. II, pp. 205-206, 261-263, and 309-312. London, 1900.

⁶⁴ Strabo, Bk. VI, Ch. I, 5.

⁶⁵ Mommsen: *History of Rome*, Vol. I, pp. 415-418. New York, 1905.

jects under foreign rulers. Hence their constant rebellions through five centuries of Genoese rule, their chronic brigandage and feuds, all together yielded a crop of outlaws who found a ready outlet for their energy in piracy, while hatred for the mainland states gave them motive enough for depredations.⁶⁶

The rugged coast of the Maritime Alps and Ligurian Apennines, with no harbors and few anchorages and only a slender strip of tillable soil here and there, occupied an advantageous position on the ancient line of coastwise traffic between Italy and the Rhône Valley. From the earliest times the Ligurians who held this mountainous littoral systematically pillaged by land and sea.⁶⁷ The little Stoechades Islands (Isles d'Hyères), which were cultivated by the Greek citizens of Massilia, were provided with garrisons to ward off piratical attacks, in the days before Imperial Rome brought order in these waters.⁶⁸ The Massiliot coast settlements to the west suffered as did the Pisans to the east. And only a century or more of constant conflict reduced the marauders to subjection.⁶⁹ By the second century B. C. their raids became intolerable, because they were in a position to threaten Rome's increasing coastwise trade with Massilia, the new *Provincia Romana*, and Spain, which was acquired in 201 B. C.

The Spanish commerce suffered also from buccaneers who had their base in the numerous lurking places of the Balearic Archipelago. These islands had been occupied by the Carthaginians at an early date⁷⁰ as advanced outposts against the Massiliots, and long served as stations for piratical descents upon Massiliot merchantmen;⁷¹ for this mode of warfare was more congenial than big conflicts to all representatives of the Phoenician race. After the Punic Wars, these islands continued to be haunts of sea-robbers, until in 123 B. C. the Romans were forced to seize them in order to secure Spanish trade from further molestation.⁷²

These islands possessed for the most part a fertile soil and ample fisheries, which together yielded an adequate but by no means sumptuous food supply and inclined the inhabitants to peaceful pursuits.⁷³ But the frequent appearance of Balearic slingers among the Carthaginian mercenaries during the Punic Wars⁷⁴ points to a pressure of population upon the means of subsistence in the home islands which might readily tip the scales in favor of piracy. Furthermore, the abundant coves and hiding-places along their coasts suited to small craft and a location within striking distance of two important trade routes of the western Mediterranean disposed the inhabit-

⁶⁶ David Hanney: *The Sea Trader*, p. 253. Boston, 1912.

⁶⁷ Strabo, Bk. IV, Ch. VI, 2-4.

⁶⁸ Strabo, Bk. IV, Ch. I, 10.

⁶⁹ Mommsen: *History of Rome*, Vol. II, p. 375; Vol. III, p. 382, note. New York, 1905.

⁷⁰ Diodorus Siculus, Bk. V, Ch. 16.

⁷¹ Mommsen: *History of Rome*, Vol. II, p. 143. New York, 1905.

⁷² *Ibid.*, Vol. III, pp. 233 and 291.

⁷³ Diodorus Siculus, Bk. V, Ch. 17. Strabo, Bk. III, Ch. V, 1, 2.

⁷⁴ Polybius, I, 67; III, 33, 72, 83, 113; XV, 11.

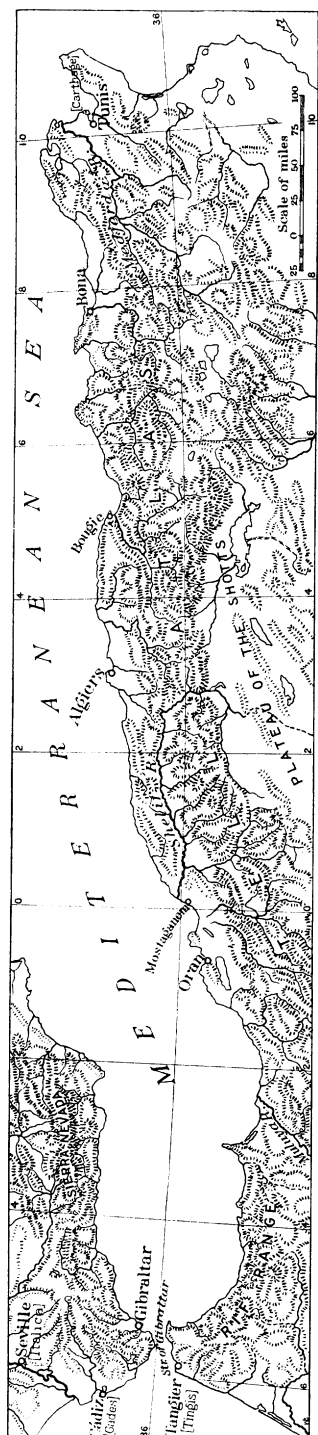


FIG. 3—The Barbary coast. Scale, 1:4,500,000. (Ancient names in half-line type.)

ants to freebooting activities so soon as orderly control of the seas was relaxed; and they likewise attracted both individuals and nations to whom lawless pursuits were congenial. There is a recognized law of such geographic polarity.⁷⁵ Thus, the Balearic Isles were seized by the Saracens in 798 and became the haunt of pirates who were attracted thither from all the surrounding coasts. In 1009 they were erected into a separate corsair kingdom, which for over two centuries preyed upon the growing trade of Catalonia near by, especially the port of Barcelona. The Catalans and Pisans participated in a Crusade against the islands, instituted by Pope Paschal II; but not until James I, King of Aragon and Count of Barcelona, conquered and annexed them between 1229 and 1235, were Catalan merchantmen safe on the sea.⁷⁶ With the restoration of order, the archipelago became the center of a thriving maritime commerce which justified the wisdom of the ancient Rhodians⁷⁷ and Phoenicians⁷⁸ in placing trading colonies on these islands.

The rugged mountainous front which Africa presents to the western Mediterranean possesses all the qualifications for a typical pirate coast (Fig. 3), except in the Tunisian peninsula, where alluvial plains and broad intermontane valleys give access to a large and fertile hinterland. Here ancient Carthage found the land base for her great territorial and maritime empire. At several points along the Atlas coast small alluvial plains, like that at modern Oran, Mostaganem, Algiers, and Bona, break the continuity of the mountain rampart bordering the sea and afford a local food supply,

⁷⁵ E. C. Semple: *Influences of Geographic Environment*, p. 160. New York, 1911.

⁷⁶ Ulick R. Burke: *History of Spain*, Vol. I, p. 258. London, 1900.

⁷⁷ Strabo, Bk. XIV, Ch. II, 10.

⁷⁸ John Kenrick: *Phoenicia*, pp. 116-118. London, 1855.

but they are barred from hinterland trade. In front of them, on the other hand, from time immemorial have passed fleets of merchantmen, laden with the products of the East, to be exchanged in the markets of Spain; for along this coast ran the great sea thoroughfare of ancient times, leading to the Pillars of Hercules. Hence this littoral in all ages has sent out piratical raiders against the commerce of the western basin and the opposite shores of Europe.⁷⁹ Prior to Pompey's great campaign it furnished retreats and markets for the buccaneers who terrorized Italy and Sicily. The Rif coast, whose rugged mountains wall the African front of the Iberian Sea for two hundred miles east of the Strait of Gibraltar, was an incorrigible pirate haunt. Its native Mauri or Berber sea-rovers found a profitable field of operations in the nearby strait and the rich Spanish province of Baetica in the Guadalquivir valley, with its island port of Gades (Cadiz). In the second century of the Empire they repeatedly raided up the river as far as Italica (Seville), in spite of the Imperial troops stationed there to overawe the pirates. Tingis (Tangier) also had a garrison whose main duty was to hold the Rif corsairs in check; but their inroads across the strait into the rich districts of southern Spain continued through the whole imperial period. In Nero's time they caused the Baetica shore to be described as *trucibus obnoxia Mauris*. They were troublesome in the reign of Marcus Aurelius, again under Septimus Severus, and again under Alexander.⁸⁰

The geographical location of the Tunisian peninsula offered facilities for the conduct of wide-reaching maritime trade, when Carthaginians, Sicilian Greeks, and later the Romans maintained order on the sea; or for equally wide piratical depredations, when the decline of Imperial Rome gave free rein to the Vandal kingdom of North Africa. This ill-organized, barbarian community, bent upon spoils more than conquest or power, utilized the nautical aptitude of the local inhabitants and the commanding position of Carthage to pillage all the neighboring coasts from Spain to Venetia and western Greece.⁸¹ Its maritime supremacy was maintained for thirty years during the life of King Genseric, but, gradually declining, was crushed in 533 with the downfall of the Vandal dominion.

The Mohammedan conquest of North Africa in the seventh century brought a new lease of life to piracy on this coast and intensified it by racial and religious wars which prolonged it through a thousand years. The disintegration of the Saracen dominion in Africa into several small states during the fourteenth century and the arrival here of the Moorish exiles from Spain in 1502 lent new motives, both of self-protection and vengeance, to the pirate communities of the African coast. Bougie, Algiers, and Sallee, outside the Strait, became notorious haunts of the "sea-skimmers." Spain, in an effort to police the pirate coast, seized Tunis, Oran, and an island fort

⁷⁹ Article "Barbary Pirates," *Encycl. Britann.*, 11th edit., Vol. 3, 1910.

⁸⁰ Mommsen: *Provinces of the Roman Empire*, Vol. I, pp. 73-74; Vol. II, pp. 353. New York, 1887.

⁸¹ Gibbons: *Decline and Fall of the Roman Empire*, Vol. IV, pp. 1 and 27. Edit. by J. B. Bury, London, 1901.

in the Bay of Algiers, but was soon forced to relinquish them, because new vigor was infused into this whole pirate coast by Turkish corsair captains from the Aegean. They seized Tunis, Algiers, and Tripoli and formed them into military republics living by plunder under a nominal Turkish suzerainty. Here piracy reached its zenith in the seventeenth century but maintained itself till the French conquest of Algiers in 1830, though the Rif pirates continued their raids for several decades. The striking feature of Barbary piracy is its survival long after Mohammedan corsairs had elsewhere abandoned their trade.⁸² This was made possible by the rivalry of England, France, and Turkey in the Mediterranean, the maritime weakness of Spain and Italy, the peculiar geographical fitness of the Barbary coast for piracy, and the elements of its population, constantly recruited from robber tribes of the desert and of the Atlas Mountains.

Piracy was a social-economic effect of geographic conditions in the Mediterranean basin, but it produced in turn certain political effects that played no small part in Mediterranean history. Instances have already been given where pirate fleets were employed as a mercenary navy. In all probability those were fleets maintained and trained by piracy which Xerxes drafted into his forces for the Grecian campaign from the shores of Cilicia, Pamphylia, and Lycia.⁸³ Organized Persian rule offered them a legitimate occupation for their energies. Several centuries later King Tryphon (146-139 B. C.), a usurper on the throne of Syria, encouraged the corsairs of Cilicia and used their help to maintain his position.⁸⁴ Spartacus in 72 B. C. relied on the aid of pirates in the Servile War.⁸⁵ The buccaneer allies of Sertorius in the Spanish uprising were a match for the Roman fleet, and from their stronghold at Diana on the Artemisian promontory they intercepted Roman supply ships on their way to the army in Spain.⁸⁶ Cilician pirates under the leadership of Sertorius attacked the Pityussae Islands off the Spanish coast.⁸⁷ In the long-sustained Mithradatic Wars, all the pirate fleets of the eastern Mediterranean were employed by the Asiatic king to reinforce his Pontic and Aegean navies. By their aid he established his supremacy on the sea, almost paralyzed the Roman offensive for several years in the first war and protracted the final conflict in the second.⁸⁸ The presence of large bodies of corsairs for hire introduced, therefore, an incalculable factor into many Mediterranean wars.

Constant piratical attacks had an important politico-economic effect upon the states assailed. These found it necessary to build up a standing navy to convoy their merchantmen, protect the home coasts, and destroy

⁸² Article "Barbary Pirates," *Encycl. Britann.*, 11th edit., Vol. 3, 1910. Hans Helmolt: *History of the World*, Vol. IV, pp. 251-254. New York, 1904.

⁸³ Herodotus, VII, 91-92.

⁸⁴ Mommsen: *History of Rome*, Vol. III, p. 292. New York, 1905.

⁸⁵ *Ibid.*, Vol. IV, p. 362.

⁸⁶ *Ibid.*, Vol. IV., pp. 282 and 286.

⁸⁷ Plutarch: *Sertorius*, Ch. VII.

⁸⁸ Mommsen: *History of Rome*, Vol. IV, pp. 28, 33-43, 323-324, 333-334 and 351-353. New York, 1905.

the marauding fleets. The increased maritime efficiency and daring which they thus attained reacted favorably upon their merchant marine. In all probability the sea power of Minoan Crete at the time it established its thalassocracy had been developed in part by wars against early Aegean corsairs. Negligent Rome in the last half century of the Republic was driven again and again to refit or supplement or rebuild its rotting fleet to cope with the Mediterranean pirates. Venice, as has been shown, was forced to adopt a big naval program by freebooting neighbors on the Dalmatian coast. Genoa, Pisa, Amalfi, and Barcelona, in their protracted naval wars with the Saracen pirates of the western Mediterranean, built up a sea power which inaugurated or greatly stimulated their successful careers as maritime states.⁸⁹

Constant piratical attacks led not only to reprisals but also to conquest of the lawless coasts in order to police them. The captured ships and seamen went to swell the naval and merchant marine of the victorious nation, thus contributing to its sea power. The newly acquired coasts often proved so valuable as bases for extended maritime trade and military operations, that they whetted the national thirst for farther territorial expansion. Instances of this process have already been given, notably in the case of ancient Rome and mediaeval Venice in their campaigns against the Dalmatian pirates. Spain in the early sixteenth century was drawn by the Barbary pirates into a war which might have resulted in the conquest of the African coastlands, had not Spain's attention been diverted at the time by the wealth of the Americas. James I of Aragon, at the instigation of his commercial subjects of Barcelona, conquered and annexed the piratical Balearic Isles. It was the revival of Barbary corsair activities after the Napoleonic Wars that in 1827 drew the unemployed energies of France to the occupation of Algiers and inaugurated her important North African policy.

The French conquest of the strongest robber state dealt a serious blow to the Barbary pirates. Shortly before they had been chastised by American, English, and Dutch warships. But what whipped them was steam navigation. Their rugged coasts could not breed mechanics and engineers.

⁸⁹ Bella Duffy: *The Tuscan Republics*, pp. 1, 2, 115-117, 23-26 and 34-35. New York, 1893. Articles "Genoa" and "Pisa," *Encycl. Britann.*, 11th edit., Vols. 11 and 21, 1910 and 1911.



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CLIMATIC AND GEOGRAPHIC INFLUENCES ON ANCIENT MEDITERRANEAN FORESTS AND THE LUMBER TRADE

ELLEN CHURCHILL SEMPLÉ

The Mediterranean Basin is a climatic unit. It is a region of winter rains and summer drought, of warm summers and mild winters. The summer drought increases in length and intensity from north to south. The annual precipitation throughout the region as a whole is relatively scant, but it varies greatly from one district to another. It declines from north to south, from highland to lowland, and from the west side of peninsulas and islands to the east side. It ranges from 10 inches at Alexandria to 20 inches at sea level in Crete, 52 inches in Corfu, and over 60 inches on the Alps near Trieste; from 8 inches at Cairo to 36 inches in the mountainous littoral of Algiers; from 16 inches at Athens on the eastern side of Hellas to 40 inches in Cephalonia only 170 miles away on the western side, where the land lies exposed to the rain-bearing winds.* It is not the amount of the rainfall, however, but its seasonal distribution which characterizes the Mediterranean climate.¹

This climate is due to the location of the Mediterranean Basin between two regions of sharply contrasted precipitation—between the tradewind or desert tract of Africa and the belt of the prevailing westerly winds, which all year round bring rain from the Atlantic to northern and middle Europe. The Mediterranean Basin occupies a transition zone between the two, and partakes in turn of the climatic character of each, according to the season of the year. In summer it approximates the arid conditions of the Sahara; in winter it reproduces the stormy skies and frequent rains of France and Germany; but the aridity is greatly attenuated along the northern rim of the Basin, and the rainy season is similarly attenuated along the southern rim, except

* NOTE.—After reviewing the evidence, the author has reached the conclusion that no appreciable change of climate has occurred in the Mediterranean region in historical times. Therefore recent rainfall statistics are cited.

¹ For general character of the Mediterranean climate and vegetation today, see A. Philippson, *Das Mittelmeergebiet*, Leipzig, 1907.

Theobald Fischer, *Mittelmeerbilder*, Leipzig, 1908.

Naumann and Partsch, *Physikalische Geographie Griechenlands*, Breslau, 1885.

Wilhelm, Deecke, Italy, Trans. from the German. London.

R. Fitzner, *Niederschlag und Bewölkung in Kleinasien*, *Peterm. Georg. Mitt. Ergänzungsheft*, vol. xxx, No. 140. Gotha, 1903.

F. Trzebitsky, *Niederschlagsvertheilung auf. der Südost Europäischen Halbinsel*, *Peterm. Geog. Mitt.*, vol. 55, Gotha, 1909.

M. Newbegin, *The Modern Geography*, New York and London, 1911.

where the high Atlas Mountains make a local area of heavy precipitation.

The Mediterranean Basin as a whole is distinguished not only by a common type of climate, but by a type of vegetation whose common physiognomy reflects the prevailing climatic conditions. Thus the ancients described it, and thus we find it today. Trees, shrubs, herbs and grasses in their structure and life course show a close adaptation to their environment. Many of them which were immigrants from northern Europe and central Africa became modified to suit Mediterranean conditions of climate and soil.

Like the Mediterranean climate, Mediterranean vegetation shows a series of graduated transition forms. On the north it merges into the plant life of middle Europe with its dense forests, abundant deciduous trees, juicy grasses and weeds, which are amply watered by the rains all year round, grow during the summer heat, and rest during the winter cold. On the south it gradually passes over into steppe and desert vegetation adapted to arid conditions—a sparse growth of thorny or spiny shrubs armed to resist the prevailing drought and to conserve the meager store of water which they get during the winter showers. Mingled with these shrubs is an equally sparse growth of grasses and herbs which spring up in moister districts after the winter rains, hasten through their few weeks of life, and die down under the parching summer heat. In desert and steppe alike the growth is thin; each plant stands apart from its fellows in an effort to monopolize a maximum space for its thirsty roots.

In type and in location the Mediterranean vegetation stands between these two contrasted groups of plant life. It knows neither the blessing of the all-year rainfall, nor the curse of Africa's aridity, but it has a taste of the latter in the long summer drought, while in the winter rains it gets the abundant moisture of the north, combined with sufficient warmth to keep its life processes going. In winter and spring, therefore, it has its period of growth, and in summer its period of rest. To these natural conditions it has adapted itself, and under them it has spread over Mediterranean lands as far as Mediterranean climatic influences penetrate. It finds its limit not far from the sea itself, because this body of water is the main reservoir of the winter moisture. At a relatively short distance back from the coast the typical Mediterranean vegetation gives place to steppe vegetation, as in Africa, central Spain and Asia Minor. In the mountains, where the winters are colder and the summers moister, it merges into a highland vegetation which closely resembles that of middle Europe, and in higher altitudes it passes over into Alpine types. The genuine Mediterranean vegetation, therefore, belongs to the lowlands and to the vicinity of the coasts. It is most typical in the middle zone of rainless summers found

in southern Spain and Italy, in Greece and Palestine. Farther south it is gradually transformed into the plant life of the steppes; farther north it merges into that of middle Europe.

In this broad transition zone, cereals and other grasses, having superficial roots and hence depending on the surface moisture in the soil, sprout during the warm rains of autumn, grow slowly during the winter, rapidly during spring, and reach maturity in early summer. After this they dry up in the drought and heat. Tuberous, bulbous and annual plants, likewise dependent upon surface moisture, are reawakened to life by the first warmth of spring, grow and blossom and seed while the soil is still damp, thus completing their life processes before the summer drought. To these groups of plants belong the chief crops of cereals and vegetables raised by Mediterranean agriculture. Therefore, from time immemorial winter has been the period of tillage in Mediterranean lands for all native crops, spring or early summer the harvest time, and middle or late summer a season of comparative leisure for farm labor.

Plants and trees that weather the long summer are equipped to resist drought. Many have elaborate root systems, which enable them to gather in moisture from a large area and especially from the deeper layers of soil. Their leaves are commonly narrow, often needle-shaped, so that they present the least possible surface to the sun. Some take the form of spines and thorns, which indicate approach to desert conditions. The leaves have a dark green or gray color, with a polished or resinous surface above and a silvery coating of hairs beneath. All these are nature's devices to diminish evaporation and thus conserve moisture in the plants. Many species of trees are dwarfed and gnarled, with stocky trunks and low branches hugging the ground, where rest the moister strata of air; for the higher the trees, the more they are exposed to the drying action of the winds. Others that grow tall, like the cypress, spring up into a slender spire of dark green, presenting little surface to the sun. Trees and shrubs at sea level are evergreen or nearly so. Even deciduous trees lose their leaves for only a brief space, because they need both the winter rain and summer heat to complete their life functions.

Mediterranean forests reflect the vicissitudes of their life conditions embodied in the long summer drought. The dense continuous forests which stretch across middle and northern Europe under the influence of an ample and well distributed rainfall reach their southern limit just within the northern border of the Mediterranean Basin. Beyond this margin, life conditions fluctuate or fail; the summer water supply is inadequate. Each tree, therefore, appropriates a large area with its spreading roots in order to get sufficient moisture. Consequently Mediterranean forests are usually sparse woodlands or savannahs, open

plantations into which the light penetrates. Genuine forests of the European stamp are found only on the northern rim of the Basin and on high mountains which are able to condense moisture from the summer clouds. They are ample on the Pyrenees, Alps, northern Apennines, the Macedonian highlands, and the mountain coasts of the Black Sea. In southern districts they occur as islands of green foliage on lofty mountains, like the peaks of Sicily, Arcadia, Crete and Cyprus, and especially on westward facing slopes like Mount Amanus and Lebanon. Palestine, even in very early times, knew no forests except the pine woods of Mount Hermon, firs and cedars of Lebanon, and the oak groves of Bashan or Gilead. Scarcity of timber made tall trees conspicuous landmarks and even objects of worship. In the southern lowlands forests degenerate into poor scrub growth, or shrink to detached groups of trees about a spring pool, or contract to a narrow ribbon of foliage along a wadi bed, or are replaced by irrigated plantations of domestic trees as in Egypt, or they succumb to the power of the desert.

The mountains of the Mediterranean Basin show climatic zones of altitude with their appropriate tree growth. On lower slopes the forests consist of mountain pine and evergreen oaks, up to an altitude of 2,000 or 3,000 feet. Above that height grow deciduous trees, like the oak, elm, chestnut and beech; at this elevation they get enough rain to do their life work in summer, when they also get more heat than the winter affords. The chestnut grows at altitudes from 2,000 to 5,000 feet according to the latitude; above it is the beech, and higher still are firs and cedars. Deciduous trees increase in abundance from lower to higher altitudes and from south to north. This is also the ancient distribution described by Theophrastus and Pliny. Theophrastus found the water-loving plane-trees lining the banks of the perennial rivers of Greece;² and today the modern traveler, tramping through the Vale of Tempe along the swift-flowing Peneus, enjoys their grateful shade.

The dense forests that covered the mountains along the northern rim of the Mediterranean Basin undoubtedly intensified their barrier nature in ancient times, and helped to discourage invasion by the pastoral nomads of the Eurasian grasslands. The wooded heights of the Caucasus, Balkans and Carpathians probably deflected many a migration away from Asia Minor and Greece, and turned it westward over the open plains of the lower and middle Danube towards Italy and Gaul. But these thick border forests once passed, the early peoples who pushed their way into Mediterranean lands found easy going for themselves and their wide-horned cattle through the open woodlands of the valleys and coastal plains. When they halted to make permanent settlements,

² Theophrastus, *De Historia Plantarum*, Bk. iv, ch. v, 6.

they had only thin forests to clear before sowing their crops. This consideration must have been an important factor in territorial expansion in the days when stone and bronze axes were the only weapons of attack upon hardwood trees. Indeed, history gives us hints that the primeval forests of Cyprus³ and Corsica⁴ were a deterrent to the earliest Greek and Roman settlements on these islands.

The relative paucity of trees in the lowlands and coastal strips, just where population settled thickest, resulted in a rapid denudation of the forests about the ancient cities and towns. This in turn gave rise to early importation of various woods from better timbered regions to deforested districts like Attica, and to forestless areas like Philistia and Egypt, whose local species of trees yielded little or no lumber. The result was the very early development of the lumber trade. This supplied the demand for fuel, building materials, cabinet woods and ship timber; the latter included special kinds of lumber for keel, hull, decking, masts and oars.

Owing to the diminution of rainfall from north to south, from west to east, and from highland to lowland, these were exactly the directions in which the chief lumber traffic moved. Exceptions occurred mainly where choice woods from a limited area of production gradually acquired wide use, as in the case of the tall pines of the Caucasus and the unsurpassed cedars of Lebanon. The ebony and teak imported from India over the eastern rim of the Basin met a demand in all the capital cities.

The wide distribution of mountains within and around the Mediterranean Basin made the highlands the predominant source of lumber from the earliest historical times. In the *Iliad*, Achilles sent mules and wood cutters to Mount Ida to bring oak for the funeral pyre of Patroclus down to the Trojan plain. Later Priam got the fuel for the pyre of Hector from the same source.⁵ Mount Pelion furnished the shaft of ash for the spear of Achilles.⁶ Sarpedon fell in battle "as falls an oak or silver poplar or a slim pine tree that on the hills the shipwrights fell with whetted axes, to be timber for ship-building." The roar of conflict about the dead Sarpedon was "as the din of wood-cutters in the glades of the mountains."⁷

The scant rainfall of the Eastern Basin except on the highlands emphasized the value of the mountain forests. Therefore, the ancients had a sharp eye for this source of their lumber supply. Homer speaks

³ Strabo, Bk. xiv, ch. vi, 5.

⁴ Theophrastus, *Hist. Plant.*, Bk. v, ch. viii, 2.

⁵ *Iliad*, xxiii, 118-121; xxiv, 663.

⁶ *Iliad*, xix, 390-392.

⁷ *Iliad*, xvi, 482-384; 634-636.

of "the topmost crest of wooded Samothrace;"⁸ Hesiod knew "where oaks the mountain dells imbranch on high,"⁹ and Aristophanes "the wood-crowned summits of the lofty mountains."¹⁰ Theophrastus, discussing the tree life of the Eastern Basin, alludes to the woodlands of the plains, but discourses at length on the important forests of Lebanon and Taurus mountains, Mt. Tmolus of Lydia, the Mysian Olympus, Mt. Odygnos of Lesbos, Phrygian Ida, Mt. Cytorus and the other Pontic ranges of Asia Minor, Haemus and other Thracian mountains, the Macedonian highlands, Thessalian Olympus, the high wooded ridges of Magnesia, certain ranges of northern Hellas, Mt. Parnassus and certain peaks of Euboea, Mt. Cyllene and the Arcadian highlands in general, Mt. Ida of Crete and the Leuca ranges in the western part of that island.¹¹ He repeatedly emphasized the general superiority of mountain woods for timber purposes, even where a given species of tree grew alike in highland and lowland and reached a taller growth in the more fertile soil of the plain. In the case of mountain trees, he discriminated in favor of forests covering the high level stretches or terraces of plateau and range, as against the stunted timber of the lofty summits.¹² It is a striking fact also that Theophrastus constantly cites the classification, nomenclature and description of trees current among the people of Phrygian Ida, Macedonia and Arcadia.¹³ All these were mountaineers, backward in the culture prized by the Attic Greeks, but evidently recognized authorities in everything pertaining to forestry and lumbering.

Pliny, who enumerated the lumber resources of the whole Mediterranean Basin, also noted that the quality of trees depended upon their place of growth. According to him, the best Italian timber came from the Alps and Apennines, the best Gallic woods from the Jura and Vogesus ranges. The Gallic lumber was doubtless floated down the Rhone and Saone to the Mediterranean. Other well-known lumber regions which he enumerated were all mountainous—Corsica, the Pyrenees, Bithynia, Pontus, Macedonia, Arcadia, Crete, the Lebanon district of Syria, and the coast ranges of Roman Africa which yielded the famous Atlas cedars.¹⁴

As the mountains of the Mediterranean Basin rise almost everywhere directly from the sea, the logs were floated down the drainage

⁸ Iliad, xiii, 13.

⁹ Hesiod, *Work and Days*, ii, 203.

¹⁰ Aristophanes, *Clouds*, 281.

¹¹ Theophrastus, *Hist. Plant.* Bk. iii, ch. ii, 5, 6; ch. iii, 2-4; ch. v, 1; ch. ix, 5; ch. x, 6; ch. xv, 5; xviii, 3-6, 13. Bk. iv, ch. 1, 2-3; ch. v, 2-7.

¹² Ibid. Bk. iii, ch. iii, 2.

¹³ Ibid. Books iii, iv, and ix, *passim*.

¹⁴ Pliny, *Historia Naturalis*, Bk. xvi, chs. 15, 16, 18, 39. Bk. xiii, chs. 15, 16.

streams in flood time to the nearest harbor, whence they were exported. Ancient writers frequently emphasize the accessibility of the timber supply to the coasts. Tyre and Sidon were great lumber ports from early times. When King Hiram made a contract with Solomon to furnish the wood for the new temple of Jerusalem, he sent his expert lumbermen up into the Lebanon ranges and collected the cedar and pine logs (translated "fir" in the Bible) at Tyre. There he made them into rafts and had them towed down the coast to Joppa.¹⁵ Both Tyre and Sidon furnished cedars for the rebuilding of the Jewish temple after the Babylonish captivity, and transported them by sea to Joppa.¹⁶ The various woods of Mount Ida in Phrygia reached Mediterranean trade through the port of Aspaneus, located near the head of the Adramyttene Gulf.¹⁷ Forests which did not command easy transportation to the coast long escaped the woodman's axe, or supplied merely local needs unless general scarcity of timber intensified the demand. After the Macedonian conquest of Cyprus, the Greek kings of the island began to conserve the valuable cedars of their mountains when it proved to be a losing business to pay the freight charges from the interior to the coast.¹⁸

The Mediterranean lumber trade was more active in the Eastern Basin than in the western, because of the very irregular distribution of forests and the meagre tree growth around the Levantine and Aegean seaboard. The chief importers of lumber were the populous maritime cities surrounding the Aegean, who wanted it for their big merchant marine and various domestic purposes. They used the woods of coniferous trees, like fir, various pines, juniper and cedar primarily for ships,¹⁹ but employed them also extensively in the construction of buildings. Cypress, laurel, box, olive, poplar, maple, wild fig, larch, chestnut, walnut, beech, oak, elm, ash, mulberry, plane and holly were used for carpentry and cabinet work.²⁰ Keels of ships were occasionally reinforced with oak for greater strength,²¹ or with beech when they had to be hauled.²² The modern is often amazed at the ancient use of woods for manufacturing or building purposes which are now regarded fit only for fuel or wood pulp.

Many woods were widely distributed over the Mediterranean Basin, like the box, olive, fig, various oaks and conifers. Some were found chiefly in southern lands, like the cypress in Cyrene, Crete, Rhodes

¹⁵ II Chronicles, ii, 16. I Kings, v, 5-12.

¹⁶ Ezra, iii, 7.

¹⁷ Strabo, Bk. xiii, ch. i, 51.

¹⁸ Theophrastus, *Hist. Plant.* Bk. v, ch. viii, 1.

¹⁹ Ibid. Bk. iv, ch. v. Bk. v, ch. 7-8; ch. vii, 1-3, 5; ch. viii, 1-2.

²⁰ Ibid. Bk. v, ch. iii, 1-7; ch. iv, 1-2; ch. vii, 4-8.

²¹ Ibid. Bk. v, ch. iv, 3; ch. vii, 6.

²² Ibid. Bk. iii, ch. x, 1. Bk. v, ch. vii, 2.

and Lycia,²³ and the palm in the desert belts. Those which supplied the best and most abundant lumber grew on the western slopes of high mountains or in the northern zone of the Mediterranean Basin.

The whole African coast of the Eastern Basin was practically lacking in timber, owing to the semi-desert conditions. The Egyptians cut short planks three feet long from the local acacia trees for constructing their river transport boats,²⁴ and they utilized the wood of the olive, sycamore (*Ficus Sycamorus*), *balanos* and doun-palm for cabinet and carpentry work in lieu of anything better.²⁵ The paucity of their wood supply is indicated by their skiffs made of bundles of papyrus reeds, after the manner of the balsa boats of Lake Titicaca in Peru, and by the use of the papyrus root as fuel. The highland oasis of Cyrenaica had olive, lotus and cypress trees, of which only the last could be used primarily for lumber.²⁶ The thuya or thyon tree (*Callistris quadravalvis*), a juniper nearly related to the cypress, grew abundantly in Cyrenaica and the oasis of Ammon in the fourth century B. C. It furnished material for roofs in very ancient times, but as the wood was fragrant and proof against decay, it was valuable for cabinet work.²⁷ It entered into the trade of the Eastern Mediterranean by way of Crete or Egypt. Homer makes Calypso burn it with cedar and larch to perfume her grotto, and the Book of Revelations, written in the latter part of the first century A. D., alludes to it as a choice wood of commerce.²⁸

The absence of forests and paucity of timber trees made these regions of lowland north Africa importers of lumber. The same conditions held in Palestine and the low Philistian coast. Their nearest source of supply lay in the cedar forests of Lebanon, the pine woods of Mount Amanus, which forms a northern extension of the Lebanon range, and the wooded heights of Cyprus. Hence these forested districts were national possessions envied by all the countries around the Levantine Sea. The timber of Mount Amanus and Lebanon occasioned the repeated conquest of these ranges by Egypt in the south and especially by Babylonia in the arid southeast, which had imported thence building material for its temples since 3000 B. C. or earlier.²⁹ It supplied wood for the Phœnician export trade in cedar and pine logs to Palestine and Egypt,³⁰ and for countless Phœnician fleets. Tyre secured

²³ Ibid. Bk. iii, ch. i, 6; ch. ii, 6. Bk. iv, ch. iii, 1; ch. v, 2.

²⁴ Herodotus, ii, 96.

²⁵ Theophrastus, *Hist. Plant.* Bk. iv, ch. ii, 2, 6-9.

²⁶ Ibid. Bk. iv, ch. viii, 4.

²⁷ Ibid. Bk. v, ch. ii, 7.

²⁸ *Odyssey*, v. 60. *Revelations*, xviii, 12.

²⁹ F. Hommel, *Geschichte von Babylonien und Assyrien*, pp. 328-330. Berlin, 1885.

³⁰ J. Breasted, *History of Egypt*, pp. 95, 114-115, 127. New York, 1909.

ship timber also from the coniferous forests of Mount Hermon, whose great height (8,702 feet or 2,653 meters) insured summer showers, and it imported oak for oars from Bashan.³¹

The mountain forests of Cyprus, together with the copper mines, doubtless furnished the motive for the Phoenician conquest of the island in the eleventh century B. C. Even at this early date the necessity of conserving the Lebanon timber may have become apparent, since the pine groves of Amanus had long before this been seriously invaded. Forests renewed themselves with difficulty under the climatic conditions of the Eastern Mediterranean. For centuries the Cyprian ranges furnished excellent cedar for ship-building; the Greek kings after the Macedonian conquest began to conserve the forests, which were evidently declining in extent and retreating from the shore.³² Theophrastus states that in his time (313 B. C.) the Syrians and Phoenicians made their triremes of cedar because they had no fir and little pine timber, but that the Cypriots generally preferred Aleppo pine for this purpose because it grew abundantly on the island and was superior to their other woods.³³ Strabo, on the authority of Eratosthenes, states that the forests of the Cyprian plain were once so dense that they formed an obstacle to tillage; that though they were invaded for fuel to smelt the copper and silver from the local mines, and for timber to build whole fleets of ships, nevertheless, consumption did not keep pace with the growth of the forests until, by legal enactment, the act of clearing the land was made to convey title to it.³⁴ So dense a mantle of trees would indicate a heavier rainfall in Cyprus than the meager 15 inches (37 centimeters) recorded in recent decades. Eratosthenes' account, however, may be based upon traditions of the Bronze Age, when the people of the island had imperfect tools for clearing even their woodlands, and moreover, devoted their energies to mining rather than to agriculture. Yet even in Strabo's time a forest covered the western promontory of Acamas, which was exposed to rain-bearing winds.³⁵

The high Taurus Mountains, which wall in the coast of Cilicia Trachea, Pamphylia and Lycia in Asia Minor, get today from 30 to 40 inches of rain (75 to 100 centimeters) from the southwestern storms. The Pisidian Taurus range, back of the Gulf of Adalia, abounded in forests in ancient times. It was drained by the Eurymedon and Melas rivers, which were apparently used as log streams to float lumber down to the coast; because between them lay the seaport

³¹ Ezekiel, xxvii, 5, 6.

³² Theophrastus, *Hist. Plant.* Bk. v, ch. viii, 1.

³³ Ibid. Bk. v, ch. vii, 1.

³⁴ Strabo, Bk. xiv. ch. vi, 5.

³⁵ Strabo, Bk. xiv, ch. vi, 2.

of Side, where the Cilician pirates placed their shipyards.³⁶ The Cilician and Lycian Taurus produced fine cedars,³⁷ which the pirates used for their swift-sailing boats. The Persians also utilized these timber supplies in the shipyards which they maintained on the Cilician coast. There Artaxerxes in 460 B. C. built three hundred triremes for an attack on Egypt.³⁸

After the Roman conquest the chief lumber port of this coast was Hamaxia,³⁹ near the site of modern Alaja. Just behind this town the Taurus Mountains rise to 10,266 feet (3,130 meters) and therefore get ample precipitation for forests, though the seaboard receives less than 20 inches. All this region was comparatively near Egypt and desirable to her for its timber. Hence that country, whose palm trees yielded poor lumber and whose irrigated fruit trees were too valuable for that purpose, maintained sovereignty over all or part of this forested mountain coast for nearly three hundred years after the break-up of Alexander's empire (323 B. C.). In 300 B. C. the Ptolemies owned Cyprus and the whole southern coast of Asia Minor from Rhodes and Lycia to Issus, but by 218 B. C. their possessions had shrunk to Cilicia Trachea and Cyprus.⁴⁰ These were retained till 67 B. C. and 58 B. C., respectively, when they were conquered by Rome; but later Mark Anthony assigned Hamaxia and the neighboring coast of Cilicia Trachea to Cleopatra to furnish wood for the Egyptian fleet.⁴¹ In the thirteenth century Hamaxia had a successor in the port of Alaya, where the Seljuk Turks had shipyards for their navy.⁴² So the Cilician forests persisted.

It was especially the northern mountains of the Mediterranean Basin, with their heavier rainfall and denser forests, which yielded the most ample and varied supply of timber, and which, therefore, furnished the chief cargoes for the lumber fleets of ancient times. These cargoes included other ship supplies besides woods, namely, pitch for caulking the seams of vessels, and wax for the encaustic painting of the hulls to make them impervious to water. It is a significant fact that wax and honey invariably figure as forest products in ancient Mediterranean trade, doubtless because numerous flowering trees and shrubs like myrtle, laurel, oleander, tamarisk, hawthorn, lime or linden, wild apple and pear mingled with other forest growth

³⁶ Strabo, Bk. xii, ch. vii, 3. Bk. xiv, ch. iii, 2.

³⁷ Theophrastus, *Hist. Plant.* Bk. iii, ch. ii, 6. Pliny, *Hist. Nat.* xvi, 32.

³⁸ Diodorus Siculus, Bk. xi, chs. 60, 75, 77.

³⁹ Strabo, Bk. xiv, ch. v, 3.

⁴⁰ E. A. Freeman, *Historical Geography of Europe*, Atlas, maps vi, viii, ix. London, 1882.

⁴¹ Strabo, Bk. xiv, ch. v, 3.

⁴² Guy Lé Strange, *Lands of the Eastern Caliphates*, p. 142. Cambridge, 1905.

and provided honey pastures for the bees. The rainy slopes of the Caucasus Mountains overlooking the Euxine yielded various timbers, especially those suitable for ship-building, besides wax and pitch in great abundance. These forest products were conveyed down the River Phasis to Colchis, whence they were exported.⁴³ They equipped the navies of Mithridates. Pontic pines, famous for ships, besides other woods used by builders and wheelwrights, were imported into Italy from the Caucasus forests during the last century of the Roman Republic.⁴⁴

Along the northern shore of Asia Minor, from Colchis to Heraclea Pontica and Calpe⁴⁵ in Bithynia, the high Pontic ranges facing the Euxine winds were mantled with forests of excellent ship timber, besides oak, elm, chestnut, ash, maple and a superior variety of box. These woods could be easily conveyed away, Strabo tells us. They entered the Mediterranean trade through the ports of Cerasus or Pharnacea, Amisus, Synope and Amastris.⁴⁶ The walnut wood exported from Synope was a fine variety used for making table tops. Box trees grew in such perfection and abundance on the Cytorus range⁴⁷ in the coastal belt of Paphlagonia that they became proverbial and gave rise to the saying "carrying boxwood to Cytorus," equivalent to the English "carrying coals to Newcastle." The box yielded a very hard close-grained wood, almost proof against decay, used for the manufacture of sacred images, carpenters' tools, flutes and combs.⁴⁸ It was evidently imported into Italy for these purposes, for its fame is sung by Vergil, Catullus and Ovid, who always specify the Cytorian or Phrygian variety of box.⁴⁹

In western Bithynia the mountains decrease in height, the rainfall of the Asia Minor coast declines to 28 inches (700 mm.), but the summer showers suffice for the forests. Near the Propontis, the Mysian Olympus rises to the height of 8,300 feet in the face of the Pontic winds, and receives enough precipitation (over 32 inches or 800 mm.)⁵⁰ for large, diversified forests.⁵¹ In ancient times its export

⁴³ Strabo, Bk. xi, ch. ii, 15-18.

⁴⁴ Vergil, *Georgic II*, 440-445, Horace *Carmina*, I, 14, 11.

⁴⁵ Xenophon, *Anabasis*, Bk. vi, ch. iv, 4, 5.

⁴⁶ Theophrastus, *Hist. Plant.*, Bk. iv, ch. v, 3, 5. Bk. v, ch. vii, 3. Strabo, Bk. xii, ch. iii, 10.

⁴⁷ Pliny, *Hist. Nat.*, Bk. xvi, 16. Theophrastus, *Hist. Plant.*, Bk. iii, ch. xv, 5.

⁴⁸ Theophrastus, *Hist. Plant.*, Bk. i, ch. v, 4, 5. Bk. v, ch. iii, 1, 7; ch. iv, 1, 2; ch. viii, 8.

⁴⁹ Catullus, iv, 3. Vergil, *Georgic II*, 438. Ovid, *Metamorphoses*, iv, 311.

⁵⁰ R. Fitzner, *Niederschlag und Bewölkung in Kleinasien*, pp. 78-80, rain fall map, p. 91. *Pet. Geog. Mitt., Ergänzungsheft*, vol. xxx, No. 140. Gotha, 1902.

⁵¹ Theophrastus, *Hist. Plant.*, Bk. iii, ch. ii, 5. Bk. iv, ch. v, 3. Strabo, Bk. xii, ch. viii, 3, 8.

timber was floated down the Rhyndacus River to the sea,⁵² and probably marketed through the Milesian port of Cyzicus. Mysian Olympus and Phrygian Ida furnished to the Aegean world varied and abundant timber, but little that was suitable for ship-building, according to Theophrastus.⁵³ The fir and pine forests of these ranges were probably approaching exhaustion in his time, 313 B. C. Mt. Ida's proximity to the fertile Trojan plain and the nine successive cities on the site of Ilium would suggest long exploitation of its best lumber. The process went on as late as 424 B. C. after the Athenian conquest of Lesbos, when refugees from the island occupied Antandrus on the mainland near by, and planned to build a fleet from the forests of Mt. Ida, for the purpose of harassing Lesbos and the neighboring coast cities of the Athenian league.⁵⁴

The Aegean front of Asia Minor receives an average rainfall of 25 inches in the lowlands (Smyrna 26 inches or 650 mm.). This is scant allowance for forests, especially in view of the almost rainless summers. The whole region, however, from the Troad to Caria and Rhodes is crossed by numerous short mountain ranges in close proximity to the sea; their peaks, rising from 3,500 to 4,100 feet and receiving about 30 inches or 750 mm. of rain,⁵⁵ doubtless offered in ancient times sufficient timber for the needs of the early Phoenician and Greek colonies along this coast. Forested promontories and island peaks, like Mimas (3,803 feet or 1,190 meters), Mycale (4,150 feet or 1,265 meters), Mt. Atabyrius in Rhodes (4,067 feet or 1,240 meters) and Mt. Pelinnaeus in Chios (4,147 feet or 1,264 meters), were probably one attraction to settlers who sought the deep-running inlets for their new homes. The ranges were neither long nor very high, however, and had evidently lost much of their forest covering by the Christian Era. Theophrastus mentions only the woods of the Phrygian Mountains, which lie farthest north, and those of the Tmolus Mountains in Lydia, which, however, yielded no ship timber.⁵⁶ In Strabo's time, the bold sea-washed ridges of Mycale and Mimas were still well forested and harbored abundant game, while the hill country of Ortygia near Ephesus had woods of various trees, especially cypress groves.⁵⁷ The latter doubtless furnished the famous doors of the temple of Diana, but the cedar planks for its roof⁵⁸ were undoubtedly imported from Crete, Lycia, Phoenicia or Cyprus. The early exhaus-

⁵² Theophrastus *Hist. Plant.*, Bk. v, ch. iii, 1.

⁵³ Ibid. Bk. iv, ch. ii, 5.

⁵⁴ Thucydides, iv, 52.

⁵⁵ R. Fitzner, *opus cit.* rainfall map, p. 91.

⁵⁶ Theophrastus, *Hist. Plant.* Bk. iv, ch. v, 3, 4.

⁵⁷ Strabo, Bk. xiv, ch. i, 12, 20, 33.

⁵⁸ Vitruvius, *De Architectura*, Bk. ii, ch. ix, 13. Pliny, *Hist. Nat.*, xvi, 79.

tion of the local supply of ship timber forced the big trading cities of this coast to search for it abroad. Miletus, which required much timber for her merchant marine, may have established her Pontic colonies of Synope, Amisus, Cerasus and Trapezus partly for the purpose of controlling her own ship supplies. Even Cyzicus could furnish timber from Mysian Olympus.

The busy maritime cities of eastern Greece, located in the rain shadow of the Grecian highlands, were even more dependent upon imported lumber, because their local hills and mountains, according to Theophrastus, yielded only inferior woods. Megara, when she founded the colony of Heraclea Pontica on the Euxine, selected a spot which today, as the modern Eregli, has the reputation of being unusually rainy and well timbered.⁵⁹ Heraclea was therefore designed to exploit for Megara's benefit the forests of the Pontiac ranges as well as the abundant yield of the coast fisheries there. Athens, whose local mountains were practically denuded of their forests in the time of Plato,⁶⁰ brought lumber from great distances, both for naval purposes and for building. Even fencing and beams for the Laurion mines came from over sea.⁶¹ The construction of lumber rafts equipped with sails was familiar to the Greeks. Athens occasionally secured ship timber from Phoenicia or Cyprus, and undoubtedly organized her vast Pontic trade in the days of her maritime empire with a view to the importation of Pontic lumber. She drew also upon the forest supplies of the west. The speech of Alcibiades revealing to the Spartans the Athenians' motives for the Sicilian Expedition specifies the control "of the ship timber which Italy supplies in such abundance,"⁶² and points to an established lumber trade with the Greek colonies of Magna Graecia and Sicily. A century later Theophrastus shows so detailed a knowledge of Italian woods⁶³ as to indicate their presence in the Athenian market, whither they had come in exchange for manufactured Greek wares. "The tall pines and crested oaks" of Sicily had been famous from Homeric days.⁶⁴

The nearest and most abundant supply of good ship timber for the cities of eastern Greece was found in Thrace and Macedonia,⁶⁵ where a northern location, moderate summer showers and extensive mountain ranges insured considerable forests. The best watered and therefore

⁵⁹ R. Fitzner, *opus cit.*, p. 80. E. Banse, *Die Turkei*, p. 83. Berlin, 1919.

⁶⁰ Plato, *Critias*, chap. v, p. 418. Trans. by Henry Davis. London, 1870.

⁶¹ A. Broeckh, *The Public Economy of Athens*, p. 138. Trans. from German. Boston, 1857.

⁶² Thucydides, vi, 90.

⁶³ Theophrastus, *Hist. Plant.*, Bk. iv, ch. v, 5.

⁶⁴ *Odyssey*, ix, 112-120, 186.

⁶⁵ Xenophon, *Hellenes*, Bk. vi, ch. i, 11.

the best wooded section lay between the Strymon and Hebrus rivers. The coastal plain here receives about 25 inches (625 mm.) of rain annually, but the great Rhodope highland forming its hinterland has 30 to 40 inches or more (750 to 1,000 mm.).⁶⁶ There at the mouth of the Strymon River lay the important Athenian colony of Amphipolis, founded only after repeated efforts, owing to the hostility of the local tribes.⁶⁷ Significantly enough, its site had previously been selected by an abortive colony from Miletus.⁶⁸ Contiguous to this region, less rainy, but offering protected sites for coast settlements, was the Chalcidice Peninsula, colonized by Chalcis, Eretria, Andros and Corinth. All these cities doubtless counted chiefly on the forest products among the raw materials which were the natural exports of a new and backward region.

Theophrastus recognized the general superiority of the northern timber.⁶⁹ The woods imported into Hellas for building and carpentry work he graded according to quality, as follows: Macedonian, Pontic, Mysian-Olympian, Aenianian from the high slope of the Oeta (7,078 feet or 2,158 meters) and Tymphrestus ranges (7,606 feet or 2,319 meters) in northern Hellas, down to the poor knotty timber from Mount Parnassus and the Euboean ranges. Wood of variable quality was also brought from highland Arcadia,⁷⁰ where the peaks have considerable forests even today. All the maritime cities made a steady demand for the strong, light, durable Macedonian fir, which was used for oars, masts and sailyards. Athens imported this timber through her colony of Amphipolis, which commanded the forests of the Strymon River basin. Therefore she was dealt a heavy blow when this town and its port of Eion were captured by the Spartans in 424 B. C. during the Peloponnesian War, since her navy needed constant replenishing.⁷¹ Later the expansion of Macedon over all this coast as far as the Hellespont excluded Athens from her nearest and surest lumber supply, and jeopardized her sea connection with the Caucasus and Pontic forests, until her incorporation into Phillip's empire again opened these sources of supply. Athens revolted from Cassander in 305 B. C. and forfeited her right to use the Macedonian forests. Then she turned to Demetrius of Syria and was promised timber for a hundred war ships.⁷² The wood doubtless came from the Lebanon range.

⁶⁶ F. Trzebitsky, *Niederschlagsvertheilung auf der Sudost-Europaischen Halbinsel*, *Pet. Geog. Mitt.*, vol. iv, pp. 186-7. Gotha, 1909.

⁶⁷ Thucydides, i, 100; iv, 102.

⁶⁸ Herodotus, v, 124-126.

⁶⁹ Theophrastus, *Hist. Plant.*, Bk. i, ch. ix, 2.

⁷⁰ Ibid. Bk. v, ch. ii, 1.

⁷¹ Thucydides, iv, 108.

⁷² Plutarch, *Lives*, Demetrius, x.

The Macedonian forests long remained the chief source of lumber for the Aegean states.⁷³ In 158 B. C. we find Rome prohibiting the export of ship timber from Macedon, evidently as a measure to cripple the commerce of Rhodes,⁷⁴ which was then the great middleman of the Aegean. These forests were not exhausted in Strabo's time, because the town of Datum near the mouth of the Strymon River on the Strymonic Gulf had dockyards for ship building,⁷⁵ evidence of accessible timber. But it must be remembered that this river drains an extensive highland region, which, owing to its elevation and northern location, gets a moderate rainfall in summer.

Deciduous trees, especially timber growth like the oak, ash, beech and chestnut, were widely distributed in northern and western Greece; but on the dry eastern side of the peninsula, where the rainfall rarely exceeds 25 inches, and in many localities falls far below, these trees were generally restricted to the mountains. The chestnut tree, still found in groves on Mount Olympus and the Pindus range, grows in Hellas at altitudes of 2,000 to 4,000 feet (600-1,300 mm.), but declines in size and abundance farther south. Theophrastus calls the sweet chestnut (*Castanea vesca*) the "Euboean nut." It grew on the Mysian Olympus and the Tmolus range of Lydia, whence it was called "the nut of Sardis," but was more abundant on the mountains of Euboea and the Magnesian Peninsula of Thessaly.⁷⁶ Near the foot of Mount Pelion, which still has its chestnut trees,⁷⁷ was located the Magnesian seaport of Castanea, mentioned by Herodotus and Strabo.⁷⁸ Thence probably the nutritious nuts were shipped to the large Greek cities, and took their name from the place of export, like the modern Brazilian nut. Today the best chestnuts are brought to Athens from the mountains of western Crete, where an altitude of 7,500 feet or more compensates for the southern latitude. This island, owing to its mountainous relief and its exposure to rain-bearing winds, was well wooded in ancient times⁷⁹ and supported a variety of trees, especially cypress⁸⁰ and cedar.⁸¹ These helped to maintain the navies of King Minos and the fleets of the Cretan pirates, and met a steady demand for architectural purposes both in Athens and Rome. The finest and most abundant tree was the cypress, which grew very tall on the Cretan

⁷³ Theophrastus, *Hist. Plant.*, Bk. iv, ch. v.

⁷⁴ Mommsen, *History of Rome*, vol. ii, pp. 358, 364. New York, 1872.

⁷⁵ Strabo, *Fragments*, 33, 36.

⁷⁶ Theophrastus, *Hist. Plant.*, Bk. iv, ch. v, 4.

⁷⁷ Leake, *Travels in Northern Greece*, vol. iv, p. 393. London, 1835.

⁷⁸ Herodotus, vii, 183, 188. Strabo, Bk. ix, ch. v, 22.

⁷⁹ Strabo, Bk. x, ch. iv, 4.

⁸⁰ Theophrastus, *Hist. Plant.*, Bk. iii, ch. i, 6; ch. ii, 6; ch. iii, 3, 4.

⁸¹ Vitruvius, Bk. ii, ch. ix, 13.

mountains. It yielded a superior building and cabinet wood almost proof against decay.

Oak and beech groves were widely distributed over the mountains of Greece, and furnished mast for large herds of wild and domestic pigs. Oaks especially grew on Mt. Olympus and Pelion. They covered the low Calledromus range of eastern Locris⁸² and Mt. Ptous in Boeotia.⁸³ They flourished on the Arcadian highlands and covered the heights of the Parnon range on the boundary between Argolis and Laconia.⁸⁴ The Laconian side of the high Taygetus Mountains, especially about the peak of Taletum, had forests in the second century A. D.⁸⁵ which were presumably fir and vallon oak groves such as Leake found there nearly a century ago.⁸⁶ The Taygetus Mountains now turn a bare rocky front to the Eurotas valley, except where the gulches retain soil and moisture. But the slopes, now washed bare of their humus or converted into terraced vineyards, were once mantled in oak trees which Theophrastus found characteristic of Laconia.⁸⁷ The modern traveler who motors from Sparta to Tegea in Arcadia, across the mountains forming the northern boundary of Laconia, finds these highlands (pass at 3,065 feet or 940 meters) covered with a poor oak brush, preyed upon by goats, which represents the degenerate successor of the pristine oak forests.

Western Peloponnesus presents even today a pleasant contrast to the bald eastern escarpment of Arcadia, which is located in the rain shadow of the central highland. The half of Greece lying west of the mountain backbone of the peninsula, formed by the Taygetus, Arcadian, Corax, Tymphrestus and Pindus ranges, has 30 inches (750 mm.) or more of rain a year. From the Gulf of Ambracia (Gulf of Arta) northward, the broad belt of coastal highlands is yet better supplied, and gets over 40 inches (1,000 mm.) annually; moreover, it receives slight summer showers to revive its vegetation, and these increase in frequency from Illyria northward.⁸⁸

This western front of classical Greece had sufficient rainfall to maintain considerable forests, remnants of which still survive the depredation of the goats, where located far from human habitations. In ancient times even the plain of Elis had its oak groves and woods of wild pine.⁸⁹ Forests large enough to harbor abundant deer, wild boar

⁸² Herodotus, vii, 218.

⁸³ Pausanias, Bk. ix, ch. xxiii, 4.

⁸⁴ Ibid. Bk. viii, ch. xi, 1; ch. xii, 1; ch. liv, 5. Bk. iii, ch. xi, 6.

⁸⁵ Ibid. Bk. iii, ch. xx, 4.

⁸⁶ Leake, *Travels in the Morea*, vol. i, pp. 128, 132, 251. London, 1830.

⁸⁷ Theophrastus, *Hist. Plant.*, Bk. iii, ch. xvi, 3.

⁸⁸ Philippson, *Das Mittelmeergebiet*, p. 121, maps iii, iv. Leipzig, 1907.

⁸⁹ Pausanias, Bk. v, ch. vi, 4.

and antelope covered the low hill country near Olympia and the higher Phoele Plateau,⁹⁰ which defined the boundary between Elis and Arcadia. There Xenophon and his sons used to range the forests for game before the crowds assembled for the Olympic Games.⁹¹ The towering peaks of western Arcadia, which overlook the Elian plains, were well forested in ancient times. Mount Lycaeus was mantled in maples and oaks, and therefore was sacred to Zeus.⁹² On Mount Erymanthus was staged the famous boar hunt of Hercules, which bears witness to mast groves of beech and oak. These trees grow on its slopes today, interspersed with planes; and in spring their tender green makes a background for the white blossoms of the wild pear tree.⁹³

The northern flank of mighty Erymanthus belongs to Achaia, which today has the amplest forests of oaks and conifers to be found in all the Peloponnesus, and in ancient times must have been even more abundantly supplied.⁹⁴ The ancient province occupied the northern and northwestern escarpment of the Arcadian plateau, and sloped down from a succession of lofty peaks like Erymanthus (modern Olonos, altitude 7,300 feet or 2,225 meters), Panachaicus (Voidhia, 6,320 feet or 1,927 meters), Aroanio (Khelmos, 7,724 feet or 2,355 meters) and Cyllene (Ziria, 7,790 feet or 2,375 meters). These mountains today have oak woods on their middle zone and fir forests on their upper reaches,⁹⁵ owing to the rain-bearing winds that sweep through the Gulf of Corinth. In ancient times they undoubtedly furnished convenient supplies of timber to the shipyards of Corinth and Sicyon, because they offered a choice of cedar,⁹⁶ fir and oak.⁹⁷

Across the Corinthian Gulf the mountainous coasts of western Hellas still have scattered woodlands which bear testimony to ancient forests. Parnassus, towering to the height of 8,070 feet (2,460 meters) behind the Crissaean Bay, has beautiful pine woods at 3,000 feet elevation; and its western slope is covered with a thriving, young growth of beech, oak, and conifers, through which the modern automobile road runs from Delphi north to Gravia. Groves of cypress and pine near Oeanthia in Locris in ancient times faced the Gulf of Corinth from this northern shore.⁹⁸ Naupactus, the important seaport and naval station of this coast, lay only ten miles from the Evenus River (modern Phidari) of Aetolia, whose valley was clothed in oak forests when Leake

⁹⁰ Strabo, Bk. viii, ch. iii, 32.

⁹¹ Xenophon, *Anabasis*, Bk. v, ch. iii, 9-12.

⁹² Pausanias, Bk. ix, ch. xxiii, 4.

⁹³ Leake, *Travels in the Morea*, vol. ii, p. 232. London, 1830.

⁹⁴ Pausanias, Bk. vii, ch. xxvi, 10.

⁹⁵ Leake, *Travels in the Morea*, vol. ii, pp. 112-117. London, 1830.

⁹⁶ Theophrastus, *Hist. Plant.*, Bk. iii, ch. ii. 5. Bk. iv, ch. i, 2.

⁹⁷ Pausanias, Bk. vii, ch. xxvi, 10.

⁹⁸ Pausanias, Bk. x, ch. xxxviii, 9.

visited it a century ago.⁹⁹ This stream flows out to sea between mountains over three thousand feet high, and reaches the coast between the sites of Homeric Calydon and the ancient Corinthian colony of Chalcis.¹⁰⁰ It doubtless brought down wood to build the Calydonian fleet which sailed for the Trojan War, and centuries later, ship timber to be exported to the treeless city of Corinth. All the mountains fronting this north coast of the Gulf of Patras were well wooded on their upper slopes a century ago, though cleared for cultivation below. Oak trees growing there were big enough to furnish the dug-out boats used in the navigation of the shallow Lagoon of Mesolongion between the mouth of the Evenus and the Achelous (Aspropotamo).¹⁰¹ The Achelous River opened up the well-wooded mountains of Acarnania, which faced the rain-bearing winds from the west.

To the forests of the Ionian Islands Homer himself bears witness. He was familiar with "wooded Zacynthus," the tree-grown slopes of showery Ithaca, and the wind-swept woods of Neritus.¹⁰² Abundant timber was one factor in the nautical development of all these western islands and coastlands from Zacynthus north to Epidamnus (Dyrachinin or Durazzo) on the Illyrian seaboard. Moreover, the numerous colonies planted by Corinth on these coasts in Coreyra (Corfu) Ambracia, Leucas and Epidamnus¹⁰³ suggest that the mother city, poorly provided with wood, wished to assure her supply of ship timber for her big navy and merchant marine from these western sources. From these she could not easily be cut off by great commercial rivals like Aegina, Euboean Chalcis, and Athens, which lay on the Aegean side of the Isthmus, while Corinth could import the western lumber through her port of Lechaemum on the Gulf of Corinth.

The mountains surrounding the Gulf of Ambracia (Arta) a hundred years ago still abounded in large oaks and conifers well suited to naval construction. In 1788 and for seven years thereafter ship timber from these slopes was regularly exported from Prevesa to the French navy-yard at Toulon.¹⁰⁴ When Augustus Caesar planted the important naval base of Nicopolis at the entrance of the Gulf of Ambracia,¹⁰⁵ he chose the location with remarkable insight. This big inlet marked the southern border of Epirus and of the area of heavy rainfall with occasional summer showers, which characterized the Adriatic front of

⁹⁹ Leake, *Travels in Northern Greece*, vol. i, p. 108. London, 1835.

¹⁰⁰ Thucydides, i, 108.

¹⁰¹ Leake, *Travels in Northern Greece*, vol. i, pp. 113-114. London, 1835.

¹⁰² *Iliad*, ii, 361, 632. *Odyssey*, i, 246; xiii, 243-6; xiv, 1-2.

¹⁰³ Thucydides, i, 24, 30, 80.

¹⁰⁴ Leake, *Travels in Northern Greece*, vol. i, 163-6, 172, 181-2; vol. iv, 47-50. London, 1835.

¹⁰⁵ Strabo, Bk. vii, ch. vii, 5-6.

the Balkan Peninsula.¹⁰⁶ The forests of western Hellas culminated in the mountains of Epirus. There the famous oak grove of Dodona formed the earliest sanctuary of Zeus, the Thunderer. Beyond Epirus lay the rainy coasts of Illyria and Dalmatia, whose forests supplied the pirate fleets infesting these shores from ancient times.

According to the evidence, the crying need of eastern Mediterranean lands was for ship timber. A multitude of fishing smacks, naval vessels, merchant ships, and coastwise transportation boats kept up the demand for fir, pine, cedar and minor woods which entered into their construction. The coniferous forests were therefore constantly levied upon; and they were further depleted by the steady demand for pitch, tar and resin. Traffic in these usually accompanied the lumber trade, and emanated from the same sources of supply. Pitch and tar were doubtless procured from pine and fir trees in all parts of Greece, but the chief output came from the Caucasus, Phrygian Ida, and Macedonia, especially from the extensive coniferous forests on the northern slopes of Mt. Olympus and Mt. Pierus in southern Macedonia.¹⁰⁷ In Syria pitch was distilled from terebinth and Phoenician cedar,¹⁰⁸ and was exported thence to Egypt, where it was used, among other things, for treating the surface of the bulrush boats.¹⁰⁹

The demand for all products of resinous woods was relatively greater in antiquity than now. They were employed for the preservation of ship wood and all ship equipments, for coating the interior of earthenware wine jars, and for the preparation of volatile oils, salves and ointments, which were almost universally used in ancient times. Resin and tar were the chief basis of cough medicines prepared by Greek physicians, and were ingredients of salves for external use. Oil of cedar, distilled from the Syrian cedar, was regularly used for these purposes, because its antiseptic or cleansing qualities were recognized.¹¹⁰ It was exported from Phoenicia to Egypt where it was needed for embalming the dead.¹¹¹ The Romans used it for soaking wood as a protection against decay and insect attack.¹¹² This was the ancient forerunner of the modern creosoting process.

The Western Mediterranean Basin, owing to more ample and protracted rains, was fairly well supplied with timber in nearly all its

¹⁰⁶ F. Trzebitsky, *opus cit.*, pp. 186-7.

¹⁰⁷ Vergil, Georgic III, 450. Pliny, *Hist. Nat.* xiv, 20. Theophrastus, *Hist. Plant.*, Bk. ix, ch. ii, 3-4; ch. iii, 1-4.

¹⁰⁸ Theophrastus, *Hist. Plant.*, Bk. ix, ch. ii, 2, 3. Bk. iv, ch. vi, 1. Bk. iii, ch. xv, 4.

¹⁰⁹ Exodus, ii, 3.

¹¹⁰ Naumann and Partsch, *Physikalische Geographic Griechenlands*, pp. 376-7. Breslau, 1885.

¹¹¹ Herodotus, ii, 87. Pliny, *Hist. Nat.*, xvi, 11.

¹¹² Vitruvius, *De Architectura*, ii, 9.

parts. This was true even of its African coast, because the high Atlas ranges tracing this littoral extract rain from the prevailing north winds. Hence they supported forests of big trees in ancient times.¹¹³ The woods on the mountainous Rif coast of western Mauretania in places came down close to the sea, and clothed the promontory of Mt. Abila at the Strait of Gibraltar with a mantle of great trees.¹¹⁴ These doubtless furnished timber for the ships of the Rif pirates who for two thousand years sallied out from that rugged littoral. The highest peak of the western Rif range, the modern Beni-Hassan, rises to an altitude of 7,216 feet or 2,200 meters, and lies only about twelve miles from the sea so that its timber was readily accessible. Farther east, in Algeria (ancient Mauretania Caesariensis and Numidia) the rainfall varies along the coast ranges from 24 to 32 inches (600 to 800 mm.), but exceeds this maximum in the great highlands of the Grand and Little Kabyle (ancient Byrinus Mons) where peaks towering to 7,000 feet or more get 60 inches (1,500 mm.).¹¹⁵ This was essentially the region of the famous *Atlantis silva*,¹¹⁶ or forests of a tree known to the Romans as the *citrus*, but quite distinct from the *citrus Medica* or citron. The tree was nearly related to the cypress, and yielded a beautifully variegated wood, which was imported into Italy for the manufacture of fine furniture and coffered ceilings.¹¹⁷ Pliny identifies it with the thyau or thuya tree of the Greeks, which is still a product of Moroccan and Algerian forests, and is used by the Turks in their mosques as the choicest material for ceilings and floors. Among the ancient Romans the wood was highly prized and very costly. Tables of it sometimes measured four and a half feet in diameter, and sold in Cicero's time, before the days of degenerate luxury, for a million sesterces or twenty thousand dollars.¹¹⁸ Martial reflects the popular estimate of the wood when he writes:

Accipe felices, Atlantica munera, silvas:
Aurea qui dederit dona, minora dabit.¹¹⁹

Some commentators identify this *citrus* with the *cedrus* or cedar tree of the Atlas Mountains, which Pliny rated as high as the cedars of Lebanon.¹²⁰ Vitruvius, who was an authority on architectural materials, made the same estimate of this wood. It was abundant in ancient as in modern times, and was exported to Rome. Beams of Numidian

¹¹³ Pliny, *Hist. Nat.*, v, 1.

¹¹⁴ Strabo, Bk. xvii, ch. iii, 4, 6.

¹¹⁵ Vidal-la-Blache, Atlas, map 2, p. 79. Paris, 1906.

¹¹⁶ Lucullus, x, 144.

¹¹⁷ Horace, *Carmina*, Bk. iv, 1, 20.

¹¹⁸ Strabo, Bk. xvii, ch. iii, 4. Pliny, *Hist. Nat.*, xiii, 15. Lucanus, ix, 416.

¹¹⁹ Martialis, xiv, Ep. 89.

¹²⁰ Pliny, *Hist. Nat.*, xvi, 39.

cedar used in the construction of the Temple of Apollo at Utica¹²¹ when the city was founded undoubtedly came from these forests. We must look to the same source for the ship timber which for centuries built the Carthaginian fleets.¹²² Cork and tanners' bark have through the ages contributed to the trade of Saldæ (Bougie) and Hippo Regius (Boné).

Owing to the more general distribution of forests in the Western Mediterranean Basin, the lumber trade seems never to have reached the development which it attained in the Levantine and Aegean Seas. In the days of Rome's splendor it brought building materials and choice cabinet woods from various regions to the rich and growing capital, and furnished ship supplies for the maintenance of the navy. Italy itself included the districts of heaviest rainfall and therefore of the best forests of ship timber, but certain other ship supplies, such as tar, pitch and wax, were economically produced elsewhere. Their bulk was small in relation to their value; so transportation charges were an almost negligible element in their market price.

Pitch was a regular article of commerce, procured from regions of ample coniferous forests; it was usually coupled with ship timber, resin, honey and wax. The Sila Mountains of the southern Apennines, today as in ancient times an important lumber region,¹²³ produced the famous Bruttium pitch of the Roman world.¹²⁴ This was evidently exported through the harbor of Narycium, the old Greek Epizephyrii, for Vergil couples the pitch-yielding forests with that city.¹²⁵ Gades (Cadiz) in southern Spain used the local ship timber for her own merchant marine, but supplied to Mediterranean commerce pitch, honey, wax and quantities of kermes berries or cochineal,¹²⁶ which point to oak forests. Cadiz and its vicinity get about 30 inches (750 mm.) of rain a year; but to the east rises the great Sierra de Volox with a peak 6,530 feet (1,960 m.), and from this range ample forest products were doubtless obtained. The still higher Sierra Nevada, culminating in the peak of Mulhaden (11,418 feet or 3,481 meters), and the northeastern extension of these highlands in the Sierra de Segura, rising in the Sierra Sagra to 7,872 feet (2,400 meters), were called by Strabo the mountain chain of the Bastetani, and described as thickly wooded with gigantic trees.¹²⁷ This was probably an exag-

¹²¹ Ibid., xvi, 40.

¹²² E. Speck, *Handelsgeschichte des Altertums*, vol. iii, Part I, ¶ 522. Leipzig, 1905.

¹²³ Pliny, *Hist. Nat.*, iii, 5. W. Deecke, Italy, pp. 428-430. London, 1904.

¹²⁴ Strabo, Bk. vi, ch. i, 9. Pliny, *Hist. Nat.*, xv, 7.

¹²⁵ Vergil, *Georgic II*, 438.

¹²⁶ Strabo, Bk. iii, ch. ii, 6.

¹²⁷ Strabo, Bk. iii, ch. iv, 2.

geration in view of the moderate rainfall of 20 to 30 inches, but the forests were ample enough to supply the Phoenician coast colonies of Malaca (Malaga), Maenaca, and Abdera. New Carthage probably drew the ship supplies for its busy port from Sierra Sagra by way of the Tader River (Segura), which rises on these high slopes. All the eastern Spanish littoral, except the Pyrenean coast, has a rainfall of 16 inches or less (400 mm. or less),¹²⁸ and therefore was compelled to import its timber from the mountains or from overseas. The juniper beams in the temple of Diana at Saguntum were said to have been brought by the original Greek colonists from Zacynthus.¹²⁹

Southern Sicily has a meager rainfall, but Aetna and the mountains along the northern coast get sufficient precipitation for moderate forests. Early Greek legend represented it as well wooded, abounding in stately oak groves and open forest glades where cattle pastured.¹³⁰ Odysseus found this island of the Cyclops covered with trees, among them "tall pines and crested oaks."¹³¹ Evidence of local ship timber is found in the big fleets maintained for centuries by the tyrants of Syracuse and other Sicilian cities. These enterprising rulers doubtless drew their main supply from the ample forests of Aetna;¹³² and they may also have tapped the resources of the Sila Mountains across the Strait of Messina, in those periods when Syracuse extended its control over Bruttium.

Italy was the chief seat of the lumber trade in the Western Mediterranean, owing to the considerable rainfall (30 to 40 inches or more) on the Alps and Apennines. The eastern littoral, lying in the rain shadow of the Apennines, was poorly provided with timber; but the western and northern plains, even near sea level, had a goodly covering of forests as late as the end of the fourth century B. C. Both the hills and plains of Latium were well supplied with timber. Pliny and Livy mention numerous ancient woodlands in the vicinity of Rome.¹³³ Theophrastus considers Italy one of the important sources of ship timber accessible from the Mediterranean.¹³⁴ He praises the fir and pine of Latium, but finds them excelled by the tall coniferous forests of Corsica. He mentions the fine beech groves of the Latin plain from which the Etruscans got very long planks for the keels of their

¹²⁸ Philippon, *Das Mittelmeergebiet*, p. 119, map iii. Leipzig, 1907.

¹²⁹ Pliny, *Hist. Nat.*, xvi, 40.

¹³⁰ Diodorus Siculus, iv, 5.

¹³¹ Odyssey, ix., 112-113, 186.

¹³² Strabo, Bk. vi, ch. ii, 8.

¹³³ Livy, *Historia Romae*, i, 30, 33; ii, 7. Pliny, *Hist. Nat.*, xvi, 10, 15.

¹³⁴ Theophrastus, *Hist. Plant.*, Bk. iv, ch. v, 5.

ships, and comments on the abundant growth of oak, laurel and myrtle on the promontory of Circei.¹³⁵

Hence during Italy's early centuries of retarded economic development, when she furnished only raw materials to commerce, one of her chief items of export was ship timber.¹³⁶ It is probable that firs and other woods from the northern Apennines figured in the early commercial dealings of the Etruscans with the Carthaginians, for the domestic timber of the latter was comparatively limited in variety. Greece, as we have seen, probably drew upon Italian lumber, both from the mainland and from Corsica. The forests of Corsica reached down to the shore; they were therefore readily accessible and made the island an object of conquest. At some very early date timber was cut there by the Romans, and conveyed away on rafts provided with sails. One of these was broken up by a storm and lost.¹³⁷ It was probably these wooded shores of Corsica which gave the island a high repute far away on the Ionian coast of Asia Minor, and which induced the ancient colonists from Phocaea to settle there. The Etruscans expelled the strangers from this choice forest reserve, and for centuries after exacted a tribute of pitch, honey and wax from the island.¹³⁸ Later the Romans exploited its fine boxwood, for box trees grew there to extraordinary height.¹³⁹ The familiarity of Theophrastus with this particular Corsican product¹⁴⁰ suggests that it was imported into Greece, where the hard, close-grained wood was used in carving images of the gods.¹⁴¹

The early Etruscans sought timber far afield because of some peculiar fitness for their purposes, like the long beech logs of Latium,¹⁴² or because of its superior accessibility. They had ample wood at home, owing to the northern location of their district and its numerous mountain ranges. The Ciminian forest covering the hill range of Mt. Cimini in southern Etruria was, in 310 B. C., considered as frightful and impassable by the Roman army as were the vast German forests centuries later. Not even a trader with his pack mule dared to traverse it.¹⁴³ In the Second Punic War a fleet of thirty ships was contributed by the Etruscan cities to the navy of Rome. The timber was donated by Volaterrae, Clusium and Perusia, all located in the hills of Etruria, and Rusellae on the coast, which commanded the fir

¹³⁵ Ibid. Bk. v, ch. viii, 1-3.

¹³⁶ Mommsen, *History of Rome*, vol. ii, p. 255. New York, 1906.

¹³⁷ Theophrastus, *Hist. Plant.*, Bk. v, ch. viii, 2.

¹³⁸ Diodorus Siculus, v 13.

¹³⁹ Ibid, v, 1. *Pliny, Hist. Nat.*, xvi, 16.

¹⁴⁰ Theophrastus, *Hist. Plant.*, Bk. iii, ch. xv, 5.

¹⁴¹ Ibid. Bk. v, ch. iii, 1, 7.

¹⁴² Ibid. Bk. v, ch. viii, 3.

¹⁴³ Livy, *Hist. Romae*, ix, 35-36.

forests of the Umbria River basin.¹⁴⁴ The Tiber river with the tributary Clanis, Tinia, Nar and Anio, tapped the Apennine forests of Etruria, Umbria, and the high Abruzzi Plateau of the Sabine country, and brought thence the immense supplies of lumber required by the growing capital of Rome.¹⁴⁵ From these sources came the longest and straightest planks used in Rome to build its villas, palaces and temples during the time of Augustus.¹⁴⁶

Where the Apennines bend westward and trace the Ligurian coast, they get over 50 inches of rain a year. Their rain-drenched slopes were therefore covered with dense forests in ancient times. Trees grew there to immense height and sometimes measured eight feet in diameter. Much of the wood was very superior, beautifully veined, and equal to cedar for cabinet work. This, together with excellent ship timber, was exported through the port of Genoa.¹⁴⁷ The Roman naval base of Luna, located in a deep bay (Bay of Spezia) on the southern edge of the Ligurian Apennines, undoubtedly drew thence its abundant ship supplies. This choice timber of the northern Apennines had once been employed in constructing the vessels of the Etruscan pirates; later it built the triremes of ancient Pisa for her long wars against the Ligurian pirates,¹⁴⁸ and later still the growing fleets of Rome. In the Middle Ages it equipped the merchant marine and navy of both the Pisan and Genoese Republics, when competing for the trade of the Mediterranean and fighting Saracen pirates.

Northern Italy had abundant timber also on the Alpine slopes and in the Po valley, but these supplies were in general too remote from the big centers of population in the south for the export of crude lumber, unless in response to a special demand. Larch trees which were found only in this northern district and which furnished very long, straight timbers, were transported from the Alpine valleys by the Po River to Ravenna, and from there were distributed along the neighboring coasts as far south as Ancona; but they could not stand the costly haul to Rome.¹⁴⁹ However, Tiberius Caesar, needing long beams for the construction of a bridge over his *naumachia*, ordered larch trees to be cut on the Rhaetian Alps and brought to Rome. One of these large logs was 120 feet long.¹⁵⁰ The finest bird's eye or "peacock" maple to be found anywhere came from the Rhaetian Alps and the hill ranges of the Istrian peninsula. It ranked with the famous

¹⁴⁴ Ibid. xviii, 45.

¹⁴⁵ Strabo, Bk. v, ch. ii, 5; ch. iii, 7.

¹⁴⁶ Strabo, Bk. v, ch. ii, 5.

¹⁴⁷ Strabo, Bk. iv, ch. vi, 2.

¹⁴⁸ Strabo, Bk. v, ch. ii, 5.

¹⁴⁹ Vitruvius, *De Architectura*, Bk. ii, ch. ix, 14-17.

¹⁵⁰ Pliny, *Hist. Nat.*, xvi, 39-40.

citrus wood in point of beauty, and was so valuable for cabinet work¹⁵¹ that it could bear the heavy transportation charges to distant Rome.

Ship timber from the eastern Alps was undoubtedly floated down to the Adriatic in very early times to build the Etruscan merchant ships at Adria and Spina, and later to equip the transport and naval vessels of the Romans in the ports of Aquileia and Pola. On a larger scale, however, forest products of small bulk, such as resin, pitch, honey and wax, were contributed by the tribes of the eastern Alps to Mediterranean commerce in exchange for food stuffs, and were shipped from Aquileia and other Adriatic ports.¹⁵² Fine resin used in medicine came from the foothills of the Italian Alps.¹⁵³ Cisalpine Gaul had extensive pitch works, and manufactured huge wooden wine casks lined with pitch, which aroused the admiration of Strabo.¹⁵⁴ This cooperage business was coupled with an active and long established pork-packing industry, for the abundant mast in the oak, beech and chestnut groves of the Po valley supported large herds of swine.¹⁵⁵

The Mediterranean coast of Transalpine Gaul and its Rhone valley hinterland, owing to its northern location, had ample forests. These furnished timber for the rafts and dugout boats which forwarded native traffic on the river;¹⁵⁶ and also equipped the merchant marine of the Greek traders of Massilia from the sixth century B. C.¹⁵⁷ An ancient export trade in ham and bacon from the Rhone valley to Rome indicates mast groves in this district, while a similar trade from the eastern Pyrenees points to forests there.¹⁵⁸ The conifers of the Pyrenean hinterland of the Mediterranean, nourished by a rainfall of 30 inches (750 mm.) or more, undoubtedly maintained the merchant fleets of the ancient Greek colonies of Emporiae and Rhoda, western outposts of the Massiliot settlements, while the woods of the Maritime Alps equipped the ships of the eastern outposts, Antipolis, Nicaea, and Portus Monoeci, as likewise of the native pirates, who raided Massilian commerce.

All this northern timber belt of the western Mediterranean lies within the limits of the middle-European forests. In ancient times it produced finer, more varied and abundant timber than was generally to be found in the southern districts. Moreover, the stretch from the Pyrenees to the Julian Alps long remained a colonial frontier of Rome, and hence served as a forest reserve after all the good timber of Latium

¹⁵¹ Ibid, xvi, 15.

¹⁵² Strabo, Bk. iv, ch. vi, 9-10; Bk. v, ch. i, 8.

¹⁵³ Pliny, *Hist. Nat.*, xvi, 11.

¹⁵⁴ Strabo, Bk. v, ch. i, 12.

¹⁵⁵ Polybius, ii, 15. Varro, *Rerum Rusticarum*, ii, 4.

¹⁵⁶ Polybius, iii, 42. Livy, *Hist. Romae*, xxi, 26.

¹⁵⁷ Strabo, Bk. iv, ch. i, 5.

¹⁵⁸ Strabo, Bk. iii, ch. iv, 11.

and other densely populated districts of the Peninsula had been exhausted.

The denudation of the Mediterranean forests progressed rapidly in antiquity, especially in the Eastern Basin, which in the beginning was more scantily provided with timber and developed big centers of population and advanced civilization earlier than the Western Basin. Therefore its supply was small and the demand was great. Plato, in the fifth century B. C., deplors the reckless destruction of the forests and the consequent failure of springs and streams in Greece, owing to the rapid run-off of the rain from the bared hillsides. He also indicates that the Greeks for a long time had been turning their attention to raising forest trees by cultivation,¹⁵⁹ probably in an effort to maintain a local supply of timber for minor local needs. A century later Theophrastus complained that the supply of ship timber in the Eastern Basin was very limited, and that only the forests of Macedonia and Thrace remained fairly abundant.¹⁶⁰ In the same period the cedar groves of Cyprus were retreating from the coasts into the mountain interior of the island, though the woods of the Lebanon range still survived, owing to the elevation and westward exposure of the mountains. One is led to surmise also that those expert Phoenician woodsmen, who were commended by King Solomon, may have understood the fundamental principles of forestry and therefore have intelligently exploited their timber supplies. The small copses and meager woodlands of ancient Palestine were unable to stand the onslaughts of civilization. Therefore for Abraham and other ancient sheiks it was an act of merit to plant even a solitary tree by a pool or spring.¹⁶¹ The Jews cultivated walnut and fig trees for the wood as well as for the fruit.¹⁶² They regarded the destruction of their groves by fire as a visitation from on high,¹⁶³ and the wanton destruction of fruit trees in war as a heinous offense.¹⁶⁴

In the Western Mediterranean, the recession of the forests became very apparent, but at a later date. Though the lumber trade of Italy was active enough to supply the large demand, ancient Roman farmers, as indicated by Cato's treatise on Agriculture, early began to raise plantations of various trees on their estates by irrigation, and thus supply their immediate needs for timber by local production. Under the Empire arboriculture was practiced on all Roman farms, as indicated by the instructions of Vergil, Varro, Columella and Pliny. The

¹⁵⁹ Plato, *Critias*, ch. v, p. 418. Trans. by Henry Davis. London, 1870.

¹⁶⁰ Theophrastus, *Hist. Plant.*, Bk. iv, ch. v, 5.

¹⁶¹ Genesis, xxi, 33.

¹⁶² G. Adam Smith *Historical Geography of the Holy Land*, pp. 80-81. N. Y. 1897.

¹⁶³ Isaiah, x, 18-19.

¹⁶⁴ Deuteronomy, xx, 19.

steady demand for cedar for the roofs of temples and palaces and superior buildings caused a restriction of the supply, for the best trees grew only in Africa, Crete, Syria and Cilicia.¹⁶⁵ In Pliny's time the superb forests of this wood on Mt. Ancorarius in Hither Mauretania were already exhausted.¹⁶⁶ Even before this Roman lumber ships sought the far away Caucasus ports. Denudation of the forests made such inroads upon the wood supply of Italy that by the fifth century Roman architectural technique had become modified to meet the growing scarcity and increased price of wood.¹⁶⁷

Clearing for tillage land and the legitimate consumption of wood as lumber and fuel were only part of the process of destruction. The long dry summers and the predominantly resinous character of Mediterranean timber made forest fires especially frequent and disastrous, while the high winds of the hot season fanned the flames. Such fires were a commonplace in ancient Palestine. Isaiah describes one in a metaphorical passage: "It shall devour the briers and thorns, and shall kindle in the thickets of the forest, and they shall mount up like the lifting up of smoke."¹⁶⁸ Homer knows the effect of protracted drought and strong summer winds upon such a conflagration. "Through deep glens rageth fierce fire on some parched mountain side and the deep forest beneath, and the wind, driving it, whirleth everywhere the flame."¹⁶⁹ The Greeks were familiar with the spontaneous origin of such fires in the mutual attrition of branches or trees in the dry season.¹⁷⁰

Fires were often started, either intentionally or accidentally, by the herdsmen who ranged the mountain forests with their flocks of sheep and goats in the dry season. Burning improved the pasturage, because the ashes temporarily enriched the soil, and the abundant shoots from the old roots furnished better fodder. The forests once destroyed were hard to restore. Goats clipped the young growth from the hillsides as with shears. Trees which depended on deep root systems for their moisture could not survive the summer drought; saplings with shallow roots could not get a start. Moreover, there was no shade to help conserve the surface moisture in soil and root, at a season when the dry atmosphere was especially pervious to the sun's light and heat.

The chemical decomposition of rocks has always proceeded slowly in Mediterranean lands, owing to the lack of sufficient moisture for abundant plant life. Mechanical disintegration has also been slow,

¹⁶⁵ Vitruvius, *De Architectura*, Bk. ii, ch. ix, 13.

¹⁶⁶ Pliny, *Hist. Nat.*, xiii, 15.

¹⁶⁷ Kingsley Porter, personal communication.

¹⁶⁸ Isaiah, ix, 18; x, 17-19.

¹⁶⁹ Iliad, xx, 490-492. Also xi, 154-157; xxi, 340-349.

¹⁷⁰ Thucydides, ii, 77.

owing to the lack of intense cold. Hence both weathering processes have been weak, with the result that soil has accumulated by infinitesimal degrees, and has spread in a very thin mantle over the slopes. Except in the small silted valleys the rocks lie near the surface. Alluvial plains of considerable extent are rare; plains of loess or glacial clay are wanting.¹⁷¹ The rock skeletons of Mediterranean lands are everywhere prone to thrust through the meager envelope of soil.

When the mountains were denuded of their forests, the violent autumn storms with their sudden downpour of rain scoured off the thin covering of earth from the steep declivities. The shield of foliage was no longer there to break the impact of the rain; the network of roots no longer held the light humus to the slopes. A stunted thorny scrub, the *maquis*, rooted in shallow pockets of earth, succeeded the denuded forests which formerly conserved and distributed moisture in the dry season, and preserved large areas for cultivation by irrigation.¹⁷² Under the assault of the goats, the *maquis* even has grown shorter and thinner, exposing ever larger spaces to the scouring action of rain in winter and wind in summer, till mountains have become quite bare, as in parts of Greece and Spain. In many sections of the Mediterranean a single deforestation has meant denudation of the soil also and hence, the permanent destruction of the forests.¹⁷³

Hence all Mediterranean lands today show a low percentage of forested area, despite the predominant mountain relief which would naturally be devoted to tree growth. Spain has 20.8 per cent of her area in forests, Portugal 5.2 per cent, Italy 15.7, Greece, 9.3.¹⁷⁴ These are much lower percentages than are to be found in Germany, Switzerland, Norway or Japan; yet even these probably represent in part a low scrub and not genuine forests.

¹⁷¹ Philippson, *Das Mittelmeergebiet*, pp. 142-144. Leipzig, 1907.

¹⁷² M. Newbegin, *Modern Geography*, pp. 119-128. London 1911.

¹⁷³ Philippson, *Das Mittelmeergebiet*, p. 144. Leipzig, 1907.

¹⁷⁴ *Ibid*, p. 154.

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THE ANCIENT PIEDMONT ROUTE OF NORTHERN MESOPOTAMIA

By ELLEN CHURCHILL SEMPLE

The recurrent operation of geographic factors in history is nowhere more strikingly evinced than in the policies of commercial and territorial expansion directed toward the Mesopotamian Basin. Through the ages a long succession of Asiatic, European, and Egyptian powers have desired to control this natural transit land between East and West. Ancient Chaldean, Babylonian, and Assyrian kings pushed their frontiers from the Tigris west to the Mediterranean. Persian conquerors like Cyrus and Darius, incorporating in their expanding empires the coast land of the Levantine Sea, anticipated by two or three millenniums the present design of the British power in India to control this great diagonal land route from the Persian Gulf to the Mediterranean. History shows a like recurrent outreach from the West. Phoenicia, when Sidon was young, began the *Drang nach Osten* with the peaceful penetration of trade and the establishment of commercial colonies in Mesopotamia. The Pharaohs of the Eighteenth Dynasty, the Hittite power of Asia Minor, and the Greeks under Alexander the Great marched eastward as conquerors to the Euphrates bend and beyond. Rome's expansion over her military road through northern Mesopotamia anticipated the economic outreach of modern Germany over this strategic region. Nisibis was the easternmost outpost of the Roman Empire, and in 1918 it was the eastern terminus of the German-made Bagdad Railroad.

What are the geographic factors in this recurrent historical development, this drama which returns with monotonous action and theme, though the actors change in race, nationality, and civilization from one age to another?

SIGNIFICANCE OF THE MESOPOTAMIAN PASSWAY

The valley of the Tigris and Euphrates Rivers occupies a vast geographical trough extending diagonally across southwestern Asia from the Persian Gulf almost to the Mediterranean. It lies between the massive folded mountains of Persia and Armenia on the northeast and the plateau of the Syrian and Arabian Deserts on the southwest. Thus it forms a natural passway, flanked by two regions inhospitable to travel and transportation. It finds its eastern outlet through the Persian Gulf to the Indian Ocean, and its western outlet to the Mediterranean through a breach in the barriers of mountain and desert which form the eastern rim of the Levantine Sea. Except the Red Sea-Suez route, it has no effective competitor in the communication between East and West. The commercial significance of

the Mesopotamian passway lies in the fact that it links now, as it did 5,000 years ago, two regions of contrasted climates, contrasted products, and contrasted civilizations—the temperate European countries of the Mediterranean Basin and the tropical Asiatic lands of the Indian and Pacific Oceans.

DIFFICULTY OF ACCESS FROM THE LEVANTINE SEA

Access from the Mediterranean to the Mesopotamian passage is difficult, except at one point (Fig. 1). The eastern sub-basin of the Mediterranean, known as the Levantine Sea, is surrounded on its three sides by natural barriers. Its northern coast is hemmed in by the high and rugged Taurus Mountains, which maintain a mean elevation of 6,500 feet but rise at intervals in serrated walls 10,000 feet or more. They effectually cut off the sea from the plateau interior of Asia Minor, except for the meager traffic which picks its way over the high-laid passes.¹ The southern littoral of the Levantine Sea borders the vast expanse of the Sahara and Libyan Deserts. Across this barrier only the long-drawn oasis of the Nile opens an avenue southward. On the east the Levantine Sea faces a multiple barrier which rises behind an inhospitable coast, with scarcely a harbor worthy of the name. Overlooking this unpromising littoral is a line of mountains and plateaus, stretching from the Amanus Range in northern Syria to the towering massif of Sinai (8,530 feet) in the south. These highlands are nearly everywhere steep and lofty enough, as in the alpine heights of Lebanon, or repellent enough, as in the rugged limestone plateau of Judea, to constitute serious barriers. Immediately behind the coastal highlands runs a long, narrow trough which sinks in the Jordan valley and Dead Sea 682 to 1,293 feet below ocean level. From the brink of this rift valley a second system of mountains rises parallel to the first, maintaining a mean elevation of about 2,500 feet in the south but rising to imposing heights in Mt. Hermon (9,020 feet) and the long wall of the Anti-Lebanon. East of Palestine this inner range is formed by the abrupt scarp of the Arabian Plateau. Though it rises to only moderate heights, it is a serious barrier, because the deep canyons of its drainage streams obstruct rather than facilitate the ascent from the Jordan trough. Beyond this second mountain system stretch the Syrian and Arabian Deserts, quite to the banks of the Euphrates.

COMMUNICATIONS ACROSS THE BARRIER

The Levantine Sea is therefore cut off from its eastern hinterland by double mountain walls with a moat between. Passage across this country is a series of ups and downs. The railroad from Jaffa up to Jerusalem (2,600 feet, or 792 meters) stops on the summit, discouraged from further

¹ D. G. Hogarth: *The Nearer East*, London, 1902, p. 36; Élisée Reclus: *Géographie universelle*, Paris, 1884, Vol. 9, pp. 470-479.

progress by the deep descent to the Dead Sea and the sharp ascent beyond to the heights of Moab. The railroad from Haifa follows a feasible route

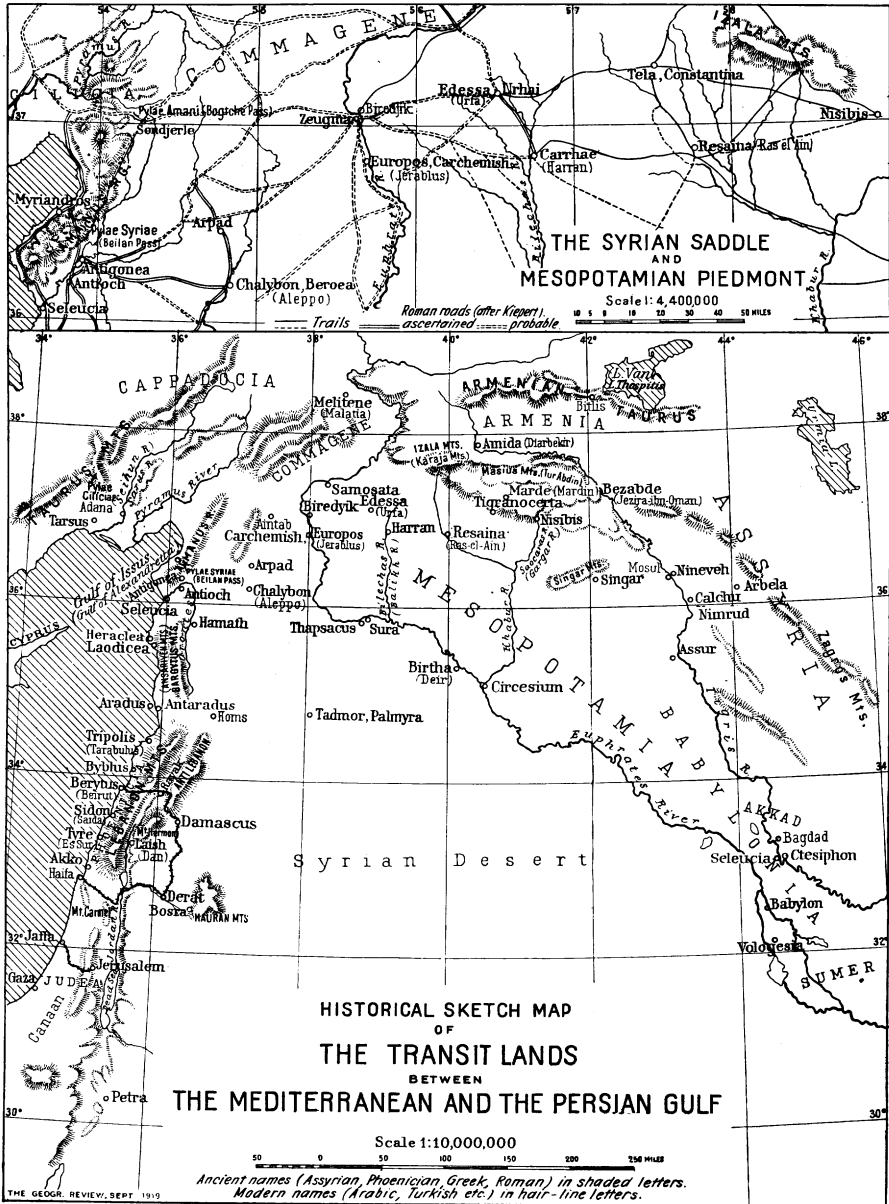


FIG. 1

eastward up the faulted plain of Esdraelon, along the track of an ancient highroad, to an elevation of 260 feet (80 meters), then drops down the

canyon of the Jalud to the Jordan River, which it crosses at 815 feet (249 meters) below sea level, mounts the Yarmuk canyon to Derat at 1,886 feet (575 meters) and, turning northward to its natural goal at Damascus, ascends at Kisweh to 2,425 feet (739 meters) before reaching its destination in the great desert metropolis at an elevation of 2,266 feet (691 meters).² The Beirut-Damascus railroad mounts the steep slope of the Lebanon Mountains from the sea by twenty miles of rack-and-pinion track, crosses the summit of the range at 4,880 feet (1,500 meters), drops to the intermontane trough at Rayak at 3,500 feet (1,070 meters), crosses the Anti-Lebanon at an elevation of 4,610 feet (1,405 meters), and finally descends nearly 2,400 feet to the plain of Damascus.³ After all the vicissitudes of up-and-down transportation, with its attendant heavy costs, these transverse railroads come out on the economic void of the Arabian Desert, save where the old volcanic soil of the Hauran and the oasis of Damascus offer limited areas of tillage.

The ancient tracks which once served travel and trade picked their way painfully across these upheaved barriers, finding their difficulties complicated on the leeward slopes of the mountains by the scarcity of water for man and beast. In the long dry summers the danger of thirst threatened also on the western or Mediterranean slopes, except where the great height of the Lebanon insured unfailing springs.

THE SUEZ-RED SEA ROUTE

The eastern barrier of the Levantine Sea has, however, a partial breach at each extremity, which in all times has readily admitted traffic from the Mediterranean. To the south the barrier shrinks and drops to the Suez Isthmus, which affords a short and level passage to the Red Sea. In ancient times the Suez-and-Red Sea route to the Orient carried comparatively little traffic, even in the palmy days of the Roman Empire. Violent northwest winds in the Gulf of Suez and the upper half of the Red Sea, prevailing all year down to the 20th parallel,⁴ a broad belt of coral reefs along the shores, desert coasts, and for the most part desert hinterland—all combined to make navigation dangerous for sailing vessels and to reduce the profits of commercial voyages. To avoid the perilous course of the upper Red Sea, ancient traffic made a long detour up the Nile River to Thebes and thence eastward across the desert by caravan to some lower Red Sea port. This was the prevailing route also through the Middle Ages. The Suez-and-Red Sea route became feasible only after the introduction of steam navigation, which made ships independent of wind systems.⁵ Hence the isthmian canal, which from very ancient times was projected, begun, and dropped—

² Karl Baedeker: *Palestine and Syria*, Leipzig, 1912, pp. 140-145 and 240-242.

³ *Ibid.*, pp. 295-298 and 300.

⁴ Julius Hann: *Handbuch der Klimatologie*, Stuttgart, 1897, Vol. 3, pp. 76-77.

⁵ M. Voss: *Der Suez Kanal und seine Stellung im Weltverkehr*, Vienna, 1904.

or constructed and then allowed to lapse into disuse again and again—first became profitable through steamer traffic.

THE SYRIAN SADDLE ROUTE

A far more frequented route was that leading from the Levantine Sea through the northern breach in the barrier to the Tigris and Euphrates valley, and thence to the Persian Gulf. Where the Gulf of Alexandretta, the ancient Gulf of Issus, drives a marine wedge fifty miles back into the coast line of northern Syria, the mountain barrier contracts and drops to the single, relatively low chain of the Amanus Range, which forms a saddle connecting the tall and massive highlands to the north and south of it. This structural saddle, whose crest rises in general to 5,000 feet, was crossed in ancient times by three pass routes.

One led from the Cilician plain eastward up a tributary of the Pyramus River (modern Djihan) to the Pylae Amani, or modern Bogtche Pass, at about 3,000 feet, dropped thence down to the ancient Hittite town of Sendjerle near the modern settlement of Islahiya, whence it proceeded southeast over the plain to Chalyb or Beroea (Aleppo). This is the route of the modern Bagdad Railroad, which pierces the pass by a three-mile tunnel.

As originally projected, the railroad was to follow the second route over the Amanus Range, which was the established path of travel in the time of Alexander the Great. This route left the Gulf of Issus at Myriandros near the later Alexandretta, crossed the range by the Pylae Syriae, or Beilan Pass, at an altitude of 2,395 feet (730 meters), and descended thence to the plain of Aleppo at 1,215 feet on the east. This was Alexander's route after the battle of Issus in 332 B. C. and the most direct line of access to the Mediterranean for any modern railroad. The Macedonian army, approaching it from Cilicia along the narrow coastal road at the western foot of the Amanus Range, met the Persians drawn up to block their advance. The military German mind which built the railway saw in imagination this coast road bombarded by British ships and hence made the railroad take a long detour to the Bogtche Pass to the north.

Forty miles south of Alexandretta the Amanus Range is cleft by the gorge of the Orontes River, which cuts a passage to the sea. To the ancient Greek road builders this offered a feasible route of easy grade, only 21 miles long, from the Mediterranean up to the plain of Antioch and Aleppo. Early settlements, probably of Phoenician origin, at both entrances to the gorge, indicate that a rough track must have penetrated this passway in very ancient times. But it was the great pass city of Antioch and its port Seleucia which exploited their geographical position as the natural western termini of the great trade route to the East. Some day they may revive as railroad termini.

Behind the Amanus Range, where the Levantine mountain rampart is thus pierced and shrunk, the moat of the rift valley disappears; the inner mountain system runs out into low hills; and the last barrier formed by the Arabian and Syrian Deserts is superseded in this more rainy northern tract by a grassy plain, which with the Amanus Range fills the scant hundred-mile stretch between the Mediterranean and the great western bend of the Euphrates River. This plain receives from 10 to 20 inches of rain, enough to maintain ample herbage for the camels and horses of passing caravans and to support winter crops of wheat and barley. Furthermore, it is furrowed by small streams flowing down from the Taurus foothills to the north, whose waters have for ages irrigated the orchards and gardens of the big market towns scattered over this plain. Hence the ancients called it the Naharina, or "land of rivers."

This northern district of Syria therefore lets down nearly all the bars between the Mediterranean and the Euphrates. It may properly be called the Syrian Saddle, because here the multiple barrier of mountains and desert is reduced to a single low passage, which gives access to the great valley of the twin rivers, stretching away southeastward for 800 miles to the Persian Gulf.

THE EUPHRATES AS A WATERWAY

The Tigris-Euphrates trough varies in width from about 200 miles in the south to nearly 400 miles in the north, where the rivers emerge from the Taurus Mountains upon the plain. Except along its highland rim on the north and east, it has a rainfall so scant as to induce steppe or desert conditions over all its area. The alluvial tract of the lower valley was reclaimed to tillage and settlement only by irrigation. Northern Mesopotamia was a grassland in winter and early spring and a desert the rest of the year. The question now is: Where lay the main route of travel through this broad but arid trough?

At first glance the Euphrates River seems to afford the shortest and most obvious line of communication. And sure enough, we find that from the gray dawn of history (3000 B. C.) the river was utilized for the transport of cedar, cypress, and pine timber from the wooded slopes of the Amanus Range and the Lebanon,⁶ and fine building stone and asphalt from upstream points, down to the head of the treeless delta and thence by canal over to the Tigris towns.⁷ These bulky commodities were floated down the Euphrates on rafts buoyed up by inflated skins, like those depicted on ancient Babylonian and Assyrian monuments. The Euphrates, however, is a poor waterway and doubtless always has been. Gathering its main supply of water in its long mountain course in Armenia, it becomes navigable for rafts in the flood season from April to August. But when

⁶ Fritz Hommel: *Geschichte von Babylonien und Assyrien*, Berlin, 1885, pp. 325-330; Hugo Winckler: *Geschichte Babyloniens und Assyriens*, Leipzig, 1892, pp. 43-44 and 56.

⁷ E. Speck: *Handelsgeschichte des Alterthums*, Leipzig, 1900, Vol. 1, p. 289.

the short winter rains are over, when the spring floods due to the melting of the mountain snows subside, when summer heat and irrigation further deplete the volume of water, the Euphrates reaches so low a stage between August and late winter that navigation is constantly interrupted by shallows and reefs.⁸

Ancient traffic on both the Tigris and Euphrates moved exclusively down stream.⁹ The means of transportation were rafts and round wicker boats plastered with bitumen.¹⁰ Such craft was unsuited to upstream navigation, especially in view of the swift current, which above the deltaic lowland runs four miles an hour in flood time. This was the season of navigation because the awkward boats were swept down stream to their destination by the rapid current and escaped the danger of shipwreck on the rocky reefs. Herodotus indicates that the Euphrates River was a common route for passenger traffic from the Mediterranean to Babylon.¹¹ In Pliny's time it took ten days to make the voyage down the river from a point near the mouth of the Balikh to Ctesiphon, the Parthian capital.¹²

The Euphrates has never invited the development of a busy highway along its banks. It flows through Mesopotamia but does not water it. Its swift stream lies at the bottom of a narrow, cliff-faced interval, hardly accessible to the nomads on the plains above. Occasionally, where the cliffs recede and admit a broader strip of alluvium along the banks within reach of irrigation from *shadûf* and water wheel, villages with cultivated fields and date palms appear. The sparse sedentary population along the Euphrates, the meager products of the arid country, the scant local commissariat for caravan or army, and the constant danger of nomad attack or blackmail¹³ combined to discourage ancient travel along the river above the delta, which marked the beginning of the dense population.

THE EUPHRATES VALLEY AS A MILITARY ROUTE

Among all the military campaigns conducted by would-be conquerors between Babylonia and the Syrian coast during 2,000 years or more, only one, so far as we have been able to discover, followed the route along the Euphrates. That was the expedition of Cyrus the Younger in 401 B. C., who took the shortest road to Babylon in order to surprise Artaxerxes before he had news of the revolt. The description of that journey in Xenophon's *Anabasis* shows this to have been no route for armies which had to live off the country. On the desert stretch below the mouth of the Khabur River, a thirteen days' march, many of the baggage animals perished from hunger, and some of the soldiers subsisted entirely upon the

⁸ Meyers *Konversations-Lexikon*, article "Euphrat."

⁹ J. L. Myres: *The Dawn of History*, London and New York, 1911, pp. 95-96.

¹⁰ Herodotus, Bk. I, Ch. 194.

¹¹ *Ibid.*, Bk. I, Ch. 185.

¹² Pliny: *Historia Naturalis*, Bk. 5, Chs. 26 and 89.

¹³ Strabo, Bk. 16, Ch. 1, § 27.

meat of the antelopes and wild asses grazing on the plains. At times it was necessary to prolong the day's march in order to get water and fodder. The few settlements on the river made a living by quarrying millstones which they sold to Babylon for grain.¹⁴ A Roman campaign, which was planned in 242 A. D. to invade Parthia by the Euphrates route and capture Ctesiphon, proved abortive owing to the lack of food. The army reached Circesium at the mouth of the Khabur River but, failing to find there the store of provisions which it had expected for the long desert stretch of the march, mutinied and turned back.¹⁵

CARAVAN ROUTES

Caravans, carrying their own food supply, followed a variant of this route many miles east of the river. They must have been confined to winter and spring, when their camels could find forage. Possibly the caravan traffic of the cooler months was supplemented by river traffic during the hot summer, when navigation was good but desert travel particularly bad. In the time of Augustus, "the road of the merchants," as Strabo calls it, to Ctesiphon or Seleucia on the lower Tigris started from the Euphrates bridge at Europos (Hittite Carchemish and modern Jerablus) and led thence for twenty-five days southeast through the steppes and deserts of the nomad Scenitae, or tent dwellers, who gave the caravans safe passage for a moderate transit duty and furnished them with water drawn from local wells or brought from a distance.¹⁶ The route along the river was avoided because of the exorbitant dues exacted by the tribes dwelling along the stream. At a later date (51 A. D.) a Parthian king evidently succeeding in suppressing or controlling this evil, because he attracted to his *entrepôt* of Volagesia and other towns on the lower Euphrates the trade which reached the upper river from Damascus. This Syrian metropolis maintained connection with the Euphrates by a desert trail running through a series of oases strung along the foot of a ridge to Tadmor,¹⁷ and thence east to BIRTHA (modern Deir) near the mouth of the Khabur River, or north to Sura, located on the Euphrates between Thapsacus and the mouth of the Balikh. During the second and third centuries A. D. Palmyra, or Tadmor, as way station between the Euphrates and Middle Syria, enjoyed a short-lived prosperity which rose and declined with this caravan trade to the Persian Gulf.¹⁸

DESERT ROUTES

Traffic on a small scale doubtless dribbled into Babylon and Damascus straight across the desert ever since those early days when "the Princes of

¹⁴ Xenophon: *Anabasis*, Bk. I, Chs. 4 and 5.

¹⁵ Theodor Mommsen: *The Provinces of the Roman Empire from Caesar to Diocletian*, New York, 1887, Vol. 2, pp. 98-99.

¹⁶ Strabo, Bk. 16, Ch. 1, § 27.

¹⁷ D. G. Hogarth: *The Nearer East*, p. 135; Ellsworth Huntington: *Palestine and Its Transformation* Boston, 1911, pp. 337-340.

¹⁸ Mommsen, *op. cit.*, Vol. 2, pp. 50, 69, 101-102, and 106.

Kedar'' brought in lambs and rams from their meager pastures for the markets of ancient Tyre. The nomads were the natural middlemen and carriers in this desultory trade. In their normal course of life, they drifted down to the marsh meadows of the lower Euphrates in summer, when their water holes were dried up and their pastures burnt bare, then back again to the desert when the winter rains revived the herbage, and on to towns of the desert fringe like Damascus and Bosra,¹⁹ to barter the products of their herds and their slender stock of Babylonian merchandise for grain and arms—the wheat of Bosra and the steel of Damascus. The Babylon and Damascus trail doubtless followed the modern caravan route. The desert junction of Petra, which traded with Gaza and Egypt, imported nothing from Babylonia, so far as the evidence shows, but only the rare products of Arabian Yemen together with the Indian and African commodities brought to Aden (Adane) and Mocha (Muza). These goods were carried from the southern ports up the Red Sea to Leuce Come (about latitude 24° N., near the modern Janbo) on the Arabian coast during autumn and winter, when the southeast monsoon was blowing. There they were transferred to caravans for transportation to Petra. The route probably followed approximately the line of the Hejas Railroad from Medina to Maan. It was impracticable for an army, so the Nabataean guide maintained who advised that the Roman campaign against this country in 25 B. C. should move by sea. The guide was made the scapegoat of an unsuccessful expedition and charged with treachery by Strabo,²⁰ who with biased judgment reasoned that the route was feasible for large caravans and therefore for an army of over 10,000 men. Only this trade in aromatics, goods of small bulk and large value like frankincense, myrrh, cinnamon, and perfumes,²¹ could stand the heavy cost of desert transportation. Fodder and water had to be purchased all along the way, and transit dues had to be paid in addition to the imperial Roman customs. Guards had to be employed then as now to protect the caravan against the robber nomads. Pliny reckoned the total cost of carriage for a camel's load of frankincense from Leuce Come to Gaza at 688 denarii, or \$150.²² Only the wealth and luxury of the Roman Empire could have supported this caravan trade on a large scale; and even so it must be remembered that the major part of these Oriental luxury articles reached Mediterranean ports by the Red Sea-and-Nile route to Pelusium or later to Alexandria.²³

THE ROUTE OF ANCIENT MILITARY COMMANDERS

Diligent research discloses no evidence that desert routes ever forwarded a large amount of trade or were ever traversed by an army. The

¹⁹ Mommsen, *op. cit.*, Vol. 2, pp. 169-170.

²⁰ *Ibid.*, pp. 316-317, footnote 2.

²¹ Strabo, Bk. 16, Ch. 4, §§ 19, 23, and 24.

²² Pliny: *Historia Naturalis*, Bk. 12, Chs. 14 and 65.

²³ Strabo, Bk. 16, Ch. 1, § 24.

nearest approach to such a venture was that of the Babylonian prince Nebuchadnezzar in 605 B. C. He was in southern Palestine about to pursue the forces of Pharaoh Necho into Egypt, when he learned that his father, Nabopolassar, had died. Fearing a pretender might arise, to save time he hurried across the Arabian Desert to Babylon with a small band of followers; but he sent his army by the circuitous route around by the Naharina, the western bend of the Euphrates, and northern Mesopotamia by which he had come.²⁴ Countless conquerors before him had traveled this road, whether they marched east or west.

This was the route of Alexander the Great. Moving north after his conquest of Egypt and Phoenicia, he crossed the Euphrates at Thapsacus in August 331 B. C. for the invasion of Mesopotamia. He did not take the short way down the river to Babylon, but struck north up the Balikh valley and then east along the piedmont of the Taurus foothills to the Tigris River, because this route offered the easiest line of march, provisions for his men, and fodder for his animals; so Arrian, his chronicler, tells us.²⁵ In Mesopotamia a food supply big enough for a large army and its transport in late summer pointed to irrigated fields, a sedentary population, and considerable towns. These were conditions which attracted ancient armies and traders to this route. They attracted also the German promoters and engineers who projected the modern Bagdad Railroad.

ANTIQUITY OF THIS ROUTE

As far back as we can penetrate into the remote past, we find that the main line of communication from the Persian Gulf to the Mediterranean followed a land road east of the Tigris along the base of the Persian highlands north to Assur or Nineveh near modern Mosul, ran thence westward along the piedmont of northern Mesopotamia to the great western bend of the Euphrates, which it crossed by ford or ferry according to the place and time of the year. Thence it continued west past Chalybon (Aleppo) to the Mediterranean by the Amanus passes or by more devious and difficult tracks farther south. From Aleppo eastward to Mosul this is the route of the Bagdad Railroad, which between Mosul and Bagdad follows the level west bank of the Tigris to avoid engineering difficulties and reduce operating expenses. Many of the stations on or near the railroad, like Nisibis, Ras-el-Ain (Resaina), Harran, Jerablus (Carchemish), and Aleppo meet us at the beginning of history. They have seen the encampment of royal Babylonian armies 2000 or 3000 B. C., and they have watched the sheik Abraham pitch his tents by their wayside waters, as he drifted westward with his clan towards the land of Canaan.²⁶

²⁴ G. C. C. Maspero: *The Passing of the Empires*, New York, 1900, p. 518; George Rawlinson: *The Five Great Monarchies of the Ancient Eastern World*, New York, 1870, Vol. 3, p. 49, footnote 16.

²⁵ Arrian: *Anabasis of Alexander*, Bk. 3, Ch. 7.

²⁶ Genesis, xi, 31: xii, 4-5.

CLIMATIC AND GEOGRAPHIC REASONS FOR THIS ROUTE

This ancient route between the Syrian Saddle and the Tigris highway finds its explanation in the climatic and geographic conditions of northern Mesopotamia. These have determined the distribution of settlements and the main lines of travel in this semi-arid land. Mesopotamia is a region of meager winter rains and long summer droughts. The dry season falls in the hottest part of the year, when great heat prevails over the plains and evaporation is intense. The precipitation from May to November is practically nil, and even in the cold season it is scant. The plains from the Persian Gulf north to the 36th parallel get less than 8 inches, or 200 millimeters, of rain²⁷ (Fig. 2). From this line northward precipitation in-

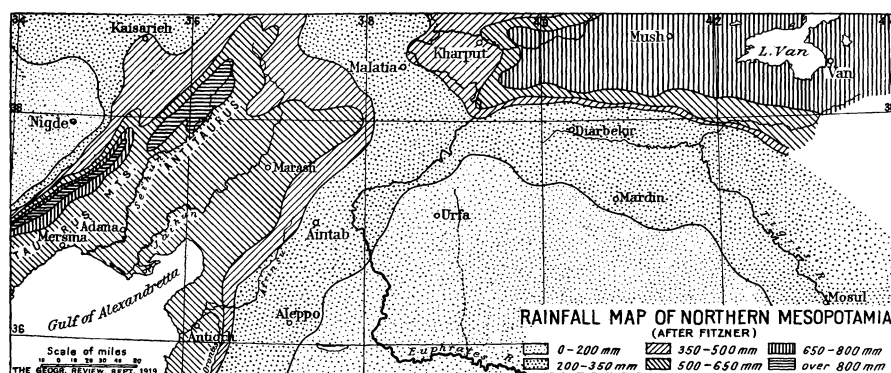


FIG. 2—(Based on source cited in footnote 27).

creases owing both to the more northern location and the higher elevation of upper Mesopotamia. The increments, however, are very small. The line of ten inches (250 millimeters) annual rainfall describes an arc subtended by the 36th parallel, with one extremity 30 miles southeast of Mosul and the other at Aleppo, while the curve runs up the Tigris River and along the crest of a series of highlands which form an outlier of the Taurus system and wall in the plains of Mesopotamia on the north.

THE URBAN BELT

These highlands consist of the Tur Abdin (ancient Mt. Masius), a long narrow plateau of 3,300 to 4,000 feet elevation with a steep escarpment to the south, and the Karaja Mountains (ancient Mt. Izala), an old volcanic massif which maintains a general altitude of about 4,100 feet, but rises to 6,068 feet in its culminating peak, only to sink westward towards the Euphrates bend in an undulating upland 2,600 feet above sea level.²⁸ These massive foothills of the Taurus are high enough to wring some mois-

²⁷ Rudolf Fitzner: Niederschläge in Klein-Asien, *Petermanns Mitt. Ergänzungsheft No. 140*, 1896, p. 90, rainfall chart.

²⁸ Hogarth, *op. cit.*, pp. 62, 91, and 97.

ture from the reluctant clouds. In winter they accumulate snow enough on their upper slopes to form a considerable reservoir of moisture; and in the spring they drop a fringe of slender torrents down to the plain. Their irrigating streams through the ages have reclaimed the northern border of the Mesopotamian steppe from pastoral nomadism and stretched a piedmont belt of towns, surrounded by well-watered gardens, orchards, vineyards, and fields, to link the settlements on the Tigris with the western bend of the Euphrates and the Syrian Saddle.

The breadth of this urban belt, the density and prosperity of its population, has generally depended upon the strength and sanity of the ruling governments, whether in Babylon, Nineveh, Antioch, Rome, or Bagdad. Its northern edge in ancient times, as in modern, was pushed well up into the highlands to an altitude of about 2,000 feet at Urhai or Edessa (modern Urfa), at the ancient Babylonian Tela near the later Roman Constantina and modern Veranshehr, as later in the first century B. C. at the Armenian capital of Tigranocerta, whose mound of ruins lies beside the modern Koihissar; and at Marde (modern Mardin) it climbed the steep slope of Mt. Masius to 3,050 feet. These upper towns enjoyed comparative immunity from nomad raids from the steppes, while they commanded numerous springs and an assured water supply. However, in Mardin in the twelfth century every house had its cistern for storing rain water;²⁹ ancient cisterns everywhere indicate the economy practiced.

The downstream settlements of this urban belt, like Harran or Carrhae, Resaina or Ras-el-Ain, and Nisibis, lay only about 1,400 or 1,500 feet above sea level; though more precariously located as to water supply and nomad attack, they nevertheless occupied a better position for trade. They were stations on the great piedmont route between the Tigris and the Euphrates, which was a type of all such roads in semi-arid lands. It marked the nice adjustment between the farthest encroachment of the desert uphill in the dry season, and the farthest assured reach desertward of the irrigation streams from the mountains behind. North of this line, where the slope from the marginal highlands was steeper, the deeper valleys cut by the swift drainage streams and the more rugged character of the country presented obstacles to transportation.

SEASONAL DEVIATIONS FROM THE ESTABLISHED ROUTE

It must not be supposed, however, that the ancient route never deviated from this line; that would be contrary to the nature of primitive roads in grasslands. In the late summer, when the interfluvial spaces were parched and the water holes dry, especially when a succession of almost rainless years had expanded the domain of the desert, then army or caravan would take a parallel path farther north, near the upper edge of the urban

²⁹ Guy Le Strange: *The Lands of the Eastern Caliphate*, Cambridge, 1905, p. 97.

piedmont belt. It would cross the Euphrates at Biredjik, one of the most important crossing places of the river from time immemorial, site of the Greek Zeugma or bridge,³⁰ and turn thence east to the ancient Greek Edessa and yet more ancient Aramaic Urhai. Then, passing numerous villages, now heaps of ruins except for their ancient cisterns which still serve travelers till late summer, it would go eastward through the upper hill towns till it reached ancient Marde. This upper track, maintaining a general level of 2,000 feet, was nearer the springs that fed the streams and offered better pasturage for the pack animal. From Marde, however, it dropped down to Nisibis, which lay on the Gargar, the last perennial stream. Few of these piedmont rivers outlive the summer drought and the tax of irrigation. The Gargar, which still waters the gardens and fields of Nisibis, is sometimes 20 feet wide in August and too deep to be crossed except at fords.³¹ Nisibis was therefore always a station on the piedmont route.

In the dry season the track continued eastward, hugging the foot of the Tur Abdin escarpment with its fountains and wells all the way to the Tigris gorge at ancient Bezabde (modern Jezira-ibn-Oman). This was the road taken by Alexander the Great in the summer of 331 B. C. An eclipse of the sun fixes the date when he crossed the Tigris as September 20, the climax of the dry season.³² However, after the winter rains had carpeted all northern Mesopotamia with grasses and flowers, the main route turned southeastward, about 20 miles east of Nisibis, and struck out straight towards Nineveh across an arid stretch of 30 miles, until it met the wadis draining northeastward from the Singar Mountains to the Tigris. This is the path of the Bagdad Railroad from Nisibis to Mosul. So stable is the geography of communications in these semi-arid lands. Yet another variant, feasible in spring for armies, turned west from Nineveh and followed the southern base of the Singar Mountains, whose barrier was high enough to make the passing winds pay a toll of water; then bent north through a gap in the range to Nisibis,³³ crossing the sheaf of wadis which united to form the Saocaras River (modern Gargar). This route was less favorable for caravans than for armies because it was exposed to nomad raids.

HISTORICAL EMERGENCE OF THE PIEDMONT ROUTE

Historical evidence shows that the Mesopotamian piedmont was the chief link between ancient Babylonia and the West. This is indicated by the persistent trend of Babylonian and Assyrian expansion westward along this piedmont, especially after 1500 B. C., when we begin to get reliable accounts of the wars for the control of northern Mesopotamia. The need

³⁰ Strabo, Bk. 16, Ch. 1, § 23.

³¹ Max von Oppenheim: *Vom Mittelmeer zum Persischen Golf*, Berlin, 1900, Vol. 2, pp. 26, 31, and 256.

³² Arrian, *op. cit.*, Bk. 3, Ch. 7.

³³ G. C. C. Maspero: *The Struggle of the Nations*, New York, 1897, p. 643.

of lumber in the treeless lands of the delta was the original motive which induced the early kings like Sargon of Akkad (2500 B. C.) to conquer the well-wooded mountains of the northwest and to extend their dominion over "the lands of the sunset sea,"³⁴ as the cuneiform records call the Mediterranean. The Euphrates River may have been the original outward line of exploration, as it undoubtedly brought down to Babylon the bulky exports from the Amanus and Lebanon forests;³⁵ but the piedmont route early begins to emerge in the movement of armies, the spread of commerce and religions. The names of its cities appear in early Babylonian history—Assur, Singar, Nisibis, Tilli or Tela, and Harran.³⁶

HARRAN AND ITS IMPORTANCE

Harran or "Road Town", located on the Bilechas River (Balikh) on the trunk route of northern Mesopotamia and at the focus of tracks radiating fanwise to the several fords of the Euphrates elbow, was the most important and influential city of all this region.³⁷ Of independent origin, reputed by tradition to be the first town after the Flood,³⁸ it became the western outpost of Babylonian civilization. By the tenth century B. C. it was a capital of Assyria co-equal with Assur itself. It was the seat of the ancient moon cult, which spread thence to Babylonia at a very early date and which later colored the religious life of Assyria to the east and of Phoenicia, Syria, and Palestine to the west.³⁹ Many of the foreign cultural influences apparent in Syria and Palestine emanated from Harran rather than from Assyria, to which they have been attributed. Contrary-wise, many Occidental influences which can be discerned in the cults of Babylonia spread to the lower Tigris by way of Harran. The Syrian weather god Rammon is domiciled in Babylon by 2000 B. C., and he is worshipped in Assur on a par with the local god Assur in 1800 B. C. The goddess Ishtar, or Astarte, or Astaroth, was chief deity of Nineveh and Arbela in Assyria. Her worship spread thence westward along the piedmont to Phoenicia, Cyprus, and western Asia Minor along the routes of Phoenician traffic in the second millennium B. C.⁴⁰

Phoenicia early secured her trade connections with the piedmont belt, because this opened up her most productive hinterland.⁴¹ She did this by means of inland colonies or trading stations, located at strategic points along established routes. Laish, or Dan, a Sidonian colony of the fifteenth century B. C., situated at the sources of the Jordan River, gave access to

³⁴ Eduard Meyer: *Geschichte des Alterthums*, Berlin, 1913, Vol. 1, pp. 420 and 519-520.

³⁵ Hommel, *op. cit.*, pp. 328-330.

³⁶ Maspero: *The Struggle of the Nations*, p. 26.

³⁷ R. W. Rogers: *A History of Babylonia and Assyria*, New York, 1900, Vol. 1, p. 300.

³⁸ Le Strange, *op. cit.*, p. 103.

³⁹ Eduard Meyer, *op. cit.*, Vol. 1, pp. 420, 519-520, and 606; Winckler, *op. cit.*, pp. 148-149.

⁴⁰ *Ibid.*, pp. 163-171.

⁴¹ Wilhelm Götz: *Die Verkehrswege im Dienste des Welthandels*, Stuttgart, 1888, pp. 95-97; Maspero: *The Struggle of the Nations*, pp. 193-194.

the old military road which led north through the Lebanon trough⁴² to the Euphrates bend. Hamath, of supposed Phoenician origin, was a station on the Orontes road, and Thapsacus, at the Euphrates ford, commanded the trading advantages at the crossing of the river. Nisibis, claimed as a Phoenician foundation because of its name,⁴³ was probably rather the seat of a Phoenician commercial factory which introduced there the wares and religions of the West. Harran participated actively in the markets of Tyre in Ezekiel's time⁴⁴ and doubtless much earlier when it was an important independent city and middleman between West and East. All Syria and Palestine evidently regarded the piedmont route as their chief line of communication with Babylonia and Chaldaea. According to Jewish legendary history, it was from Harran on this old trunk road that Abraham and his nomad tribe moved westward to Canaan.⁴⁵

COMMERCIAL VALUE OF THE MESOPOTAMIAN PIEDMONT

The Mesopotamian piedmont of town and highway extended west to the great bend of the Euphrates. There it joined the populous plain of Naharina and the Syrian Saddle, which together were the focus of trade routes radiating north, west, and south. One well-traveled road led up from Egypt along the narrow land bridge between the Mediterranean waste of water and the Arabian waste of desert sands. Another ran north-west across the Cilician plain and over the Pylae Ciliciae, or Cilician Gates, in the mighty Taurus range to the Hittite country on the Halys River in Asia Minor, where it connected with tracks leading west to the Aegean Sea. Yet another ran north from Harran through Urfa and Samosata at the passage of the Euphrates to Melitene (Malatia), where it connected with the main road through Asia Minor to the Hittite country. Besides these land routes, dissolving Mediterranean trails, whose signposts were the stars, brought Phoenician cargo ships from Egypt, Crete, and other Aegean lands and contributed rare oversea products to this focal market region.

The commodities meeting here for exchange were varied—pearls, jewels, and spices from India; embroidered garments and imitation lapis lazuli from Babylonia; gums, perfumes, drugs, and frankincense from Arabia; linen, goldwork, and inlaid ivory from Egypt; horses, cattle, and metals from Armenia and the northern mountains; sheep, goats, fruits, and wine from the piedmont towns of Mesopotamia; olive oil, wines, copper, and Tyrian purple from the Mediterranean lands, besides the beautiful manufactured wares of the Phoenician cities.

All these routes with their richly laden caravans converged upon the cities strung along the western bend of the Euphrates from Thapsacus to

⁴² Judges, xviii, 7 and 28; F. C. Movers: *Die Phoenizier*, Berlin, 1850, Vol. 2, pp. 136 and 160.

⁴³ Movers, *op. cit.*, pp. 161-165.

⁴⁴ Ezekiel, xxvii, 23.

⁴⁵ Genesis, xi, 31; xii, 5.

Samosata and those scattered over the plain between the river and the foot of the Amanus Range. Each city became a market because it was a necessary stopping place. It commanded a ford or ferry across the Euphrates, which involved a halt until all the long caravan should have safely crossed; or it supplied water to the merchant and his transport from the stream which irrigated its gardens and orchards. This was a desirable district. It offered

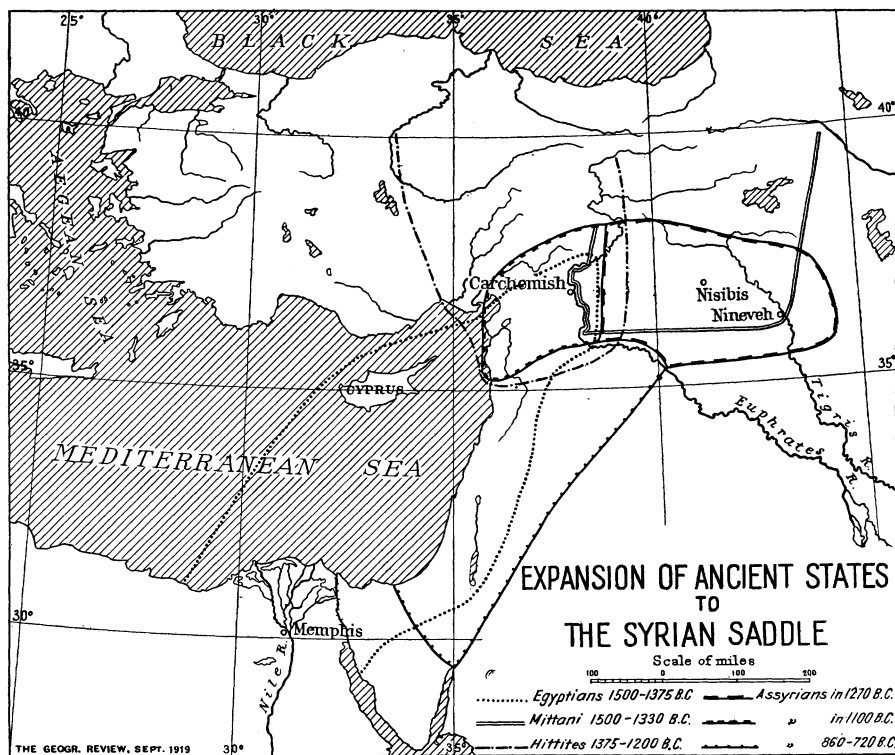


FIG. 3

big profits to the trader and big revenues to the government. Its towns were inhabited by merchant princes of vast wealth. Azaz, Arpad, Pethor, Chalybon (Aleppo), and Carchemish yielded rich booty or ransoms to the conqueror.⁴⁶ Hence this whole region early became the object of conquest from every side, while the Mesopotamian piedmont belt, which linked it with the tropical East, was hardly less the goal of expansion. Every contiguous power, no matter how small or unorganized, tried to set up its toll-gate on this great highway. A map of the series of conquests in this region from 1600 B. C. to the Crusades (see Fig. 3 for the period 1500-720 B. C.), and again through the modern period, shows all the great historical episodes to have been cast in the same mold; and this mold in turn was

⁴⁶ Rogers, *op. cit.*, Vol. 2, pp. 64-65 and 75, footnote 2; A. H. Sayce: *The Hittites*, London, 1890, pp. 46-47.

fashioned by the geographic conditions. The artificers were in turn of all races, tongues, religions, and cultural development; but their hands knew only the one cunning when it came to turning out historical events in this region.

BABYLONIAN STRUGGLE FOR TRADE CONTROL

Babylon, as we have seen, claimed suzerainty over the Syrian Saddle and the piedmont belt from about 3000 B. C. From the time when Sargon of Akkad made his expedition against the Amorites of the Orontes valley in 2500 B. C., Babylonian influences were strong throughout northern Syria,⁴⁷ disseminated there by caravans traveling either by the Euphrates track from Babylon or by the piedmont route, which apparently got most of the traffic. The Babylonian king Kadashman-Kharbe (c. 1450 B. C.), finding himself excluded from the piedmont road by Assyria's occupation of northern Mesopotamia, undertook to open a road across the Syrian Desert. He subdued the nomad Suti dwelling about the mouth of the Khabur River, made wells, erected military posts, and established Babylonian settlements along the way, which probably ran through Tadmor to Damascus. By this route, which was shorter and avoided the long detour to the north, he hoped to divert the western trade from Assyria, which was expanding along the piedmont to secure this very trade.⁴⁸ The desert road was apparently a failure, for very soon Babylonia is again fighting Assyria for the control of northern Mesopotamia, and keeps up the conflict for centuries.⁴⁹

THE RELATION OF NINEVEH TO THE PIEDMONT ROUTE

Assyria, owing to her geographic location, had a dominant interest in the traffic which moved along the piedmont belt to and from the Mediterranean ports. The cities of Assur and Nineveh, situated on the upper course of the Tigris at the head of regular navigation, were the eastern termini of the piedmont route. There goods were transferred from caravan to *kelek* for transportation downstream to Babylonia; or they went north to the fertile Lake Van district (Lake Thospitis) of Armenia by a road up the Tigris valley and over the Taurus Mountains by the Bitlis Pass (5,000 feet), the route followed later by Xenophon's retreating army. Yet other wares went east through Arbela and over the passes in the Zagros Mountains to Media.⁵⁰ Thus Nineveh, like Carchemish on the Euphrates, was a river town at the focus of land routes. Geographical location made it the natural middleman between East and West, stimulated commercial and territorial expansion, and impelled it especially to secure

⁴⁷ Eduard Meyer, *op. cit.*, pp. 389 and 601-604.

⁴⁸ Hugo Winckler: *History of Babylonia and Assyria*, transl. and edit. by J. A. Craig, New York, 1907, pp. 82-83.

⁴⁹ *Ibid.*, pp. 84-85 and 93-94.

⁵⁰ Winckler: *Geschichte Babyloniens und Assyriens*, pp. 147-148.

control of the piedmont route to the west. Hence Nineveh drove out all competitors and monopolized the profits. Finally, she seized the fords of the Euphrates at the great bend and controlled the highroads to the Phoenician ports. The process of western conquest went on for seven centuries with alternating success and failure; but it was not relinquished until Nineveh fell to Median attacks in 607 B. C.

THE DEVELOPMENT OF ASSYRIA

“The land of the city of Assur,” the original Assyria, was a colony or vassal state of Babylon;⁵¹ but it developed differently from the motherland, owing to geographic conditions. It was poor in irrigable plowland, and for this reason also turned to commerce. Its more northern location, its relatively cold winters and prevailing mountainous relief tended to produce a more enterprising and energetic population than was to be found on the low alluvium of Babylonia. Moreover, the people were probably a pure Semitic stock, unmixed with the Sumerian blood which diluted the Semitic strain in the deltaic lowland. Hence Assur developed a different type of people with different interests.⁵² It became a typical colonial frontier state, with a natural tendency to political defection born of remoteness, contrasted conditions, and divergent interests.⁵³ So it set up an independent government some time between 1800 and 1500 B. C. When the kingdom of Assyria expanded, it spread northward and westward along the lines of least physical resistance and greatest commercial opportunity. It never for any length of time transcended the Zagros Mountains to the east or the main Taurus range to the north. Its military campaigns in these directions seem to have been primarily defensive or punitive, designed to protect its own borders, while those towards the west reveal a sustained policy of expansion which had for its goal the littoral of the Levantine Sea. The cost of these campaigns was amply covered by the enormous booty, ransoms, and tributes secured from the piedmont cities which studded the main line of march from the Assyrian frontier to the Phoenician ports.⁵⁴ The treasure in these cities, varied and abundant as it was, could not have been derived from the rather meager local resources of the district and therefore bears evidence to the immense profits procured from the passing trade.

Thus the little “land of the city of Assur” of 1500 B. C. expanded into the vast Assyrian Empire. The capital shifted upstream from Assur to Calchu, or Nimrud, in 1300 B. C., and in 1100 B. C. yet farther north to Nineveh, whose ruins lie opposite the present city of Mosul. Nisibis, owing to its location near the eastern end of the piedmont route, became an early

⁵¹ Winckler: *Geschichte Babyloniens und Assyriens*, pp. 144 and 153-154; G. C. C. Maspero: *The Dawn of Civilization*, New York, 1901, p. 564.

⁵² Rogers, *op. cit.*, Vol. 2, p. 308.

⁵³ E. C. Semple: *Influences of Geographic Environment*, New York, 1911, pp. 234-238.

⁵⁴ Rogers, *op. cit.*, Vol. 2, pp. 64, 65, 75-76, 81, 96-97, and 225.

outpost of Assyria when that state in the fourteenth century began to expand westward through northern Mesopotamia. A letter preserved in the Tell el Amarna collection, written by Assuruballit in about 1370 B. C. to the Pharaoh Amenophis IV, discusses the existing conditions of the road between Egypt and Assyria and complains that his mountain neighbor and commercial rival, the king of the Mittani, enjoyed special consideration in the Egyptian trade.⁵⁵ This letter indicates the ambition of the Assyrian king and the obstacles that lay in his path.

ASSYRIA'S ENEMIES

For the seven centuries of her westward advance, Assyria ran the gauntlet between enemies on the north and south who wished to get a foothold in the piedmont belt. From the south came repeated attacks from Babylon, several of which between 1300 and 960 B. C. succeeded in temporarily recovering Mesopotamia.⁵⁶ Moreover, the nomads of the grasslands were prone to encroach on the better-watered territory of the piedmont and constantly had to be expelled.⁵⁷ A decline of Assyrian power after the death of Tiglath-Pileser I enabled the Aramaean tribes of the Syrian Desert to push north and northeast into the Mesopotamian piedmont and the Nahrina. They were drawn thither by the prospect of trade, for such nomads are natural middlemen. Hovering about the fringes of the cultivated land, they had probably furnished camel transport for the piedmont commerce or taken a hand in the caravan commerce down the Euphrates to Babylon. Now they established little independent states on the lower Khabur River, the Balikh, and on both banks of the Euphrates below Carchemish. Chief of these was Bit-Adini near Harran on the Balikh.⁵⁸ There they sought to maintain their independence against the attacks of Assyria, who tried to crush every rival middleman on the piedmont route. They were sustained by Babylon, who always hoped to reassert her claim to northern Mesopotamia; and they found a powerful champion and leader in Damascus, who, with the assistance of the nomads as well as the settled tribes, gravely threatened the western piedmont. When Assyria revived under Assurnazirpal (885-860 B. C.) it absorbed these little states, together with the Euphrates city Sura, river terminus of the desert route from Damascus via Tadmor.⁵⁹

The piedmont belt was more seriously threatened from the north. It was repeatedly conquered in whole or in part by a succession of states which rose to power in the highlands of Armenia and the mountain ranges northwest of the great bend. These kingdoms, condemned by their rugged environment to backward economic development, based their meager

⁵⁵ Rogers, *op. cit.*, Vol. 2, pp. 7-8; Winckler: *History of Babylonia and Assyria*, p. 189.

⁵⁶ *Ibid.*, pp. 93, 101, and 103.

⁵⁷ *Ibid.*, p. 104; Strabo, Bk. 16, Ch. 1, §26.

⁵⁸ Rogers, *op. cit.*, Vol. 2, p. 28.

⁵⁹ *Ibid.*, Vol. 2, p. 57-62 and 74; Winckler: *Geschichte Babyloniens und Assyriens*, pp. 176-188.

national wealth on the raw products of forest, pasture, field, and mine. They wanted a frontage on the busy thoroughfare of the plain, in order to exchange their raw products for manufactured wares and share in the lucrative trade between East and West. This they achieved by conquering from time to time a section of the Mesopotamian piedmont, setting themselves up as middlemen and levying transit dues on the through traffic. Such were the Mittani, an Aryan people of the Armenian highlands, who about 1500 B. C. pushed their frontier southward over the rim of Mt. Masius and occupied the piedmont belt from Nineveh on the Tigris through Nisibis and Harran to the bend of the Euphrates.⁶⁰ Thus they got astride of the piedmont road and cut off Assyria and Babylon from the western trade.⁶¹

ASSYRIA'S WESTWARD EXPANSION

In 1330 B. C. Assyria inaugurated her westward movement by expelling the Mittani from northern Mesopotamia. In 1270 B. C. Shalmaneser I consolidated the previous conquests, extended the frontier west to the Balikh River, if not to the Euphrates, and incorporated the city of Harran as his western capital on a par with Assur itself, to emphasize the union of the two states.⁶² In order to secure the piedmont belt from attack, he conquered the Amida (modern Diarbekir) basin of the upper Tigris, advanced his frontier up to the main range of the Taurus on the north, which served as a border rampart, and planted Assyrian colonies through the newly acquired territories as outpost defenses of Mesopotamia.

This history repeated itself again in the reign of Tiglath-Pileser I (1170 B. C.), who pushed his way to the Mediterranean,⁶³ and with slight variations many times thereafter. Assyria during centuries of struggle for an open road to the western sea had constantly to beat back these mountaineers who threatened the right flank of her advance. Her main line of march was a corridor running along the base of their highland. Defeat involved withdrawal along this corridor, constantly exposed to flank attack. The semi-arid land south of the piedmont offered a difficult line of retreat in summer and a doubtful one in spring, when fodder indeed was abundant but when the widely flooded streams impeded the progress of an army. For military strategy this piedmont belt presented much the same problem as does the Venetian plain of northern Italy, between the Austrian Alps and the Adriatic, for an Italian army advancing from the Piave River to the Carso saddle. Therefore a mountain campaign in lower Armenia was the preliminary to every movement of Assyrian expansion along the piedmont belt.

This is the principle which emerges out of the fragmentary and confused

⁶⁰ Eduard Meyer, *op. cit.*, pp. 672-673.

⁶¹ J. H. Breasted: *History of the Ancient Egyptians*, New York, 1916, p. 212.

⁶² Winckler: *Geschichte Babylonien und Assyrien*, pp. 154-161 and 165.

⁶³ *Ibid.*, pp. 172-175; Maspero: *The Struggle of the Nations*, pp. 643-647.

accounts of the wars from the fourteenth to the seventh century B. C. The highland campaign usually started from Nisibis, which controlled a road leading northward through an easy pass in Mt. Masius to the basin of the upper Tigris and thence west into the Hittite country of Asia Minor.⁶⁴ The offensive often had to be pushed as far west as the Melitene district of Cappadocia and the Commagene country, because these mountain states enclosed on the north the strategic district of converging highways west of the Euphrates bend. They commanded the passes and roads leading down to the plain of Naharina, which in turn commanded the Mediterranean outlets of the piedmont road. The temptation to encroach was irresistible, because a few months of sovereignty there yielded a big revenue in transit dues and commercial profits. Hence these little mountain states often risked the wrath of Nineveh. In the time of Tiglath-Pileser III (745-727 B. C.) they combined with the Armenian state of Urarta and extended their conquests to include Carchemish and Arpad, until the Assyrian forces drove them back again.⁶⁵

STRUGGLE OF EGYPTIANS AND HITTITES FOR THE SYRIAN SADDLE

Assyria's progress along the piedmont was a halting one, an alternating advance and retreat, owing to these constant flank attacks. Difficulties increased, however, as she approached the Syrian Saddle. The strategic importance of this district as focus of the converging western roads made it the object of attack from all sides. Here competitors multiplied—a recurring crop which had to be cut down. Prior to the Assyrian advance, while the Mittani were establishing themselves in the Mesopotamian piedmont, Thutmose I of Egypt (1530 B. C.) inaugurated a policy of territorial expansion northward to the Syrian Saddle, in order to eliminate the western middleman from the Babylonian trade, which had already assumed importance for Egypt. He and his successors secured their hold on the Naharina and the Euphrates bend, dominated the trading town of Carchemish at the middle passage of the river, and established peaceful relations with their Mittani neighbors, as the interests of trade demanded.⁶⁶

The Egyptians held this strategic area 150 years, till 1375 B. C., when they were dislodged from it by the Hittites, who had gradually been advancing southward from their mountain seat in eastern Asia Minor. They combined with their kinsmen, the Khati, who occupied the rugged mountains between the upper Pyramus River and the Euphrates above the great bend, invaded the Syrian Saddle district, and got astride of the Euphrates bend east to the Khabur River at the cost of the Mittani.⁶⁷ From this base they pushed their conquests up the Orontes valley, which formed the

⁶⁴ Maspero: *The Struggle of the Nations*, pp. 364-365.

⁶⁵ Rogers, *op. cit.*, Vol. 2, pp. 114-118.

⁶⁶ Breasted, *op. cit.*, pp. 212-234.

⁶⁷ Maspero: *The Struggle of the Nations*, pp. 364-366.

southern approach of the Syrian Saddle. Thus they gathered into their hands the whole traffic between Babylonia on the east and Egypt and Phoenicia on the west. Hittite remains have been found all along the route of the Bagdad Railroad from the Amanus Range tunnel to the Khabur River, at Sendjerle, Aleppo, Jerablus (Carchemish), and Ras-el-Ain;⁶⁸ the ancient stations are the modern stations. Remains also at Alexandretta indicate that this excellent harbor was the Hittite sea terminus of the piedmont road, as it will soon be the Mediterranean terminus of the railroad.

The Hittites had to defend their position in the Syrian Saddle against repeated attacks by the Egyptians, who suffered by their exclusion from the piedmont trade and under Rameses II, from 1288 to 1271 B. C., made a last sustained but futile effort to regain their lost advantage.⁶⁹ Soon afterwards the Hittites were assailed on the east by the rising power of the Assyrians, who for centuries battled to get and maintain their hold on the Syrian Saddle. They found it necessary to expand over the Amanus Range into Cilicia,⁷⁰ in order to control the northwestern approaches through the Cilician Gates and other Taurus passes of Asia Minor. Assyria was forced also to dominate the Phoenician littoral, which made large contributions to the piedmont trade, in order to reap the full profits of her position.

THE PHOENICIAN CITIES

The distribution of the ancient Phoenician cities in relation to the Mesopotamian piedmont reveals a significant interplay of geographic factors, of geographical isolation and security versus geographical proximity and accessibility to an established trade route, of a location which gave protection versus a location which gave profits. According to every law of geographical probability, the Phoenician settlements spread originally all along this coast from Mt. Carmel to the head of the Gulf of Issus. Mövers maintains such a distribution on the basis of place names, religious cults, mythology, and legend, even for cities like Tarsus and Mallus, which have been attributed to Greek colonists.⁷¹ It is just around the Gulf of Issus, with easy access to the Syrian Saddle and fair harbors at Alexandretta and the mouths of the Cilician rivers, that we should have expected the Phoenicians to place their commercial ports. On the evidence adduced by Mövers, so they did.

The persistent aggressions of the Babylonians, Hittites, and Assyrians, however, from 3000 to 605 B. C., jeopardized especially the northern seaboard towns which lay near the Mediterranean outlet of the piedmont route. The Amanus and Bargytus (Ansariyeh) Mountains afforded no adequate bulwark to settlements along their coast against rear attacks. Relative

⁶⁸ D. G. Hogarth: Article "Hittites," *Encyclopaedia Britannica*, 11th edit., 1910.

⁶⁹ Breasted, *op. cit.*, pp. 280-285 and 428-430.

⁷⁰ Winckler: *Geschichte Babyloniens und Assyriens*, pp. 192-198, 223-226, 241-244, and 255-258.

⁷¹ Mövers, *op. cit.*, Vol. 1, p. 404; Vol. 2, pp. 50-51 and 166-174.

security could be found only along the littoral of the broad and lofty Lebanon Range. There the great and enduring Phoenician cities grew up, protected by their geographical location—Tyre, Sidon, Berytus, Byblus, Bothrys, Tripolis, Arka, and Simyra near the northern end of the Lebanon Range. The location of all these cities was the resultant of two divergent geographic forces; it combined sufficient proximity to the piedmont road for participation in its trade, and sufficient remoteness combined with protected sites to insure the peace necessary for early industrial and commercial development. The sole exception to the rule is the conspicuous proof. That was the city of Arvad or Aradus, situated on a little island four miles off the Ansariyeh Mountains coast, about 30 miles north of Tripolis. When no war clouds hung on the land horizon, its citizens occupied a twin settlement on the coast called Antaradus and cultivated their terraced gardens while they gathered in Oriental merchandise from the inland trade routes; but, when the Assyrian wolf pack burst through the passes in the mountains, the people scurried into their boats and took refuge in their rocky island; there, Manhattanwise, they tucked themselves away in their ancient skyscrapers.⁷² An Assyrian attack on the coast settlement of Aradus was the signal to the southern Phoenician cities to mobilize their forces for defense. Conquest was followed by a period of tribute paying, then by a period of successful revolt and independence, because the long reach from Nineveh to Tyre weakened the arm of Assyrian authority.

The Gulf of Issus, before the Greek period, was not permitted to breed on its shores the goose that might lay the golden egg of maritime commerce. Undoubtedly the goose was hatched again and again, built its nest, and then was destroyed. The easy seizure of the Phoenician city of Myriandros, located on the Amanus littoral near the foot of the Pylae Syriae (Beilan Pass, 2,395 feet), when Cyrus the Younger marched through in 401 B. C. for his invasion of Babylonia, shows how exposed was the location.⁷³ Alexander the Great planned Alexandretta on the basis of a unified political control from the Mediterranean to the Persian Gulf. We are forced to think with Mövers that very ancient Phoenician towns occupied the approximate locations of Antioch and Seleucia, which the Seleucids built as the Mediterranean outlet of the piedmont road. Situations so promising could not have been overlooked. They were apparent to Antigonos, who built the town of Antigonea five miles upstream from the later Antioch,⁷⁴ near the site of the old Phoenician Heraclea. Seleucia also occupied the exact site of an earlier settlement,⁷⁵ and it faced, across the little Bay of Antioch at the foot of Mt. Casius, the ancient port of Posidium, probably of Phoenician origin. On this marine inlet lay the city of Kundu in 670 B. C., an ally of

⁷² Strabo, Bk. 16, Ch. 2, §§ 13 and 14.

⁷³ Xenophon: *Anabasis*, Bk. 1, Ch. 4.

⁷⁴ Diodorus Siculus, Bk. 20, Ch. 47; Strabo, Bk. 16, Ch. 2, § 4.

⁷⁵ Strabo, Bk. 16, Ch. 2, § 8.

Sidon and undoubtedly the seat of a Phoenician factory, which was seized by the Assyrians under Esarhaddon.⁷⁶ Thus these northern Phoenician settlements were destroyed or overlaid by Greek colonies, while the southern ones proved the law of the survival of the fittest, geographically speaking.

THE SELEUCID KINGDOM

The Seleucid kingdom succeeded Alexander's rule in this transit region between the Mediterranean and the Persian Gulf, and it fattened on the trade which streamed along the piedmont road and out to the sea by Antioch and its port Seleucia. Like previous incumbents of the Syrian Saddle, it had to defend its strategic position against attacks from several sides; but it enjoyed this advantage, that Antioch and "the land of the rivers" formed the center and not the periphery of its domain, as was the case with the ancient Egyptian, Hittite, and Assyrian possessors of this focal district.

Egypt never through the ages lost her interest in the Syrian Saddle; nor has any modern dynasty or power, native or foreign, which has fallen heir to the throne of the Pharaohs. Control of the Suez or the Nile-Red Sea route to the Orient seems to have aroused a desire to control the Mediterranean outlet of the competing Mesopotamian route. The effort of the Eighteenth Dynasty to get astride of the Euphrates bend was repeated by Necho in 605 B. C., and this ambition colored the Asiatic policy of Egypt in the intervening centuries. It animated also the Ptolemies in their attacks upon the Seleucid power in Palestine, Syria, and Cilicia. Ptolemy II in 246 B. C. captured Antioch and Seleucia, Syria, Cilicia, "and the upper districts across the Euphrates."⁷⁷ He was unable long to hold all this territory but significantly enough he kept the seaport Seleucia in his grasp for twenty-five years.⁷⁸

THE RISE OF ARMENIA

The declining power of the Ptolemies ceased to threaten the Seleucid state, which was also declining. At the beginning of the first century B. C. it had withdrawn to the west of the Euphrates before the advance of the reviving Persian or Parthian kingdom and soon was forced to defend its frontier along the Euphrates bend against a new enemy. The rising kingdom of Armenia, under its king Tigranes, had pushed its frontier south over the rim of its highland, and incorporated the Mesopotamian piedmont belt from Nineveh and Nisibis in the east to the old Carchemish district in the west.⁷⁹ It thus repeated the territorial expansion of the Mittani kingdom fourteen centuries before and with the same purpose—to get a frontage on the piedmont road. To emphasize the new outlook, the king built a

⁷⁶ Rogers, *op. cit.*, Vol. 2, pp. 223-225.

⁷⁷ J. P. Mahaffy: *The Empire of the Ptolemies*, London, 1895, pp. 34-35, 82, 87, 197, and 200.

⁷⁸ Polybius, Bk. 5, Chs. 59-60.

⁷⁹ W. R. Shepherd: *Historical Atlas*, New York, 1911, p. 33, map 2.

new capital, Tigranocerta, up in the foothills of Mt. Masius about 40 miles northwest of Nisibis; and he settled a tribe of Arab nomads in the Harran and Edessa (Urfa) districts, where they commanded the piedmont route and the chief fords or ferries of the Euphrates bend, so that they might collect transit dues for him.⁸⁰ To get outlets to the Mediterranean, he seized Antioch, northern Phoenicia, and eastern Cilicia but failed to hold them long. When Lucullus with his Roman legions pushed the Mithridatic war into Armenia in 69 B. C. and captured Tigranocerta and Nisibis, he found there treasure⁸¹ which recalls the riches of the piedmont cities in ancient Assyrian days.

THE ROMAN ADVANCE

The Roman advance eastward, like the Assyrian advance westward, had to push its way between the enemy of the mountains and that of the plains, Armenians and Parthians, who came to make common cause against the Roman intruder. Every Roman offensive began with a campaign in highland Armenia, which automatically threw the piedmont belt into Roman hands. Highland Armenia, after its conquest, was allowed to fall away; but the piedmont was retained and therewith the great traffic route between East and West. The several Euphrates fords or ferries, Carrhae (Harran), Resaina, and Nisibis, became familiar with Roman merchants traveling to and from the East, Roman customs officials, and Roman armies bound towards the Tigris road on their way to Ctesiphon; for Parthian attacks were incessant. Nisibis was a Roman frontier fortress from 115 to 363 A. D. and the regular base of operations against the Parthian capital on the lower Tigris.⁸² As the Empire declined, her eastern frontier fell back only a few miles behind Nisibis. The Patriarchate of Antioch reached from the Mediterranean to the Khabur River in 638 A. D. when the Saracens came.⁸³

THE CRUSADERS

After the Saracen conquest of Syria and Mesopotamia, traffic moved busily east and west along the piedmont road. The Arab geographers of the eleventh and twelfth centuries give glowing descriptions of its thriving cities with their irrigated fields, gardens, orchards, and vineyards, their crowded mosques and markets, as these existed under the Seljuk Turks in 1100 A. D.⁸⁴ Then the Crusaders came. With purpose more commercial than religious, they aimed directly for control of the Syrian Saddle. From 1098 to 1268 we find one noble house of Crusaders established in

⁸⁰ Theodor Mommsen: *The History of Rome*, New York, 1905, Vol. 4, pp. 315-317 and footnotes.

⁸¹ *Ibid.*, Vol. 4, pp. 339-341.

⁸² Mommsen: *The Provinces of the Roman Empire*, Vol. 2, pp. 72-73, 84-85, 94-95, and 98.

⁸³ Shepherd, *op. cit.*, p. 52, map.

⁸⁴ Le Strange, *op. cit.*, pp. 87-108.

the Principality of Antioch, extending from the Bay of Alexandretta and Laodicea east across the Orontes valley nearly to Aleppo (Fig. 4). This principality marched on the northeast with the County of Edessa (1098 to 1144), which stood fairly astride of the Euphrates bend, the upper Balikh and the upper Khabur, embracing the old district of Carchemish, Edessa,

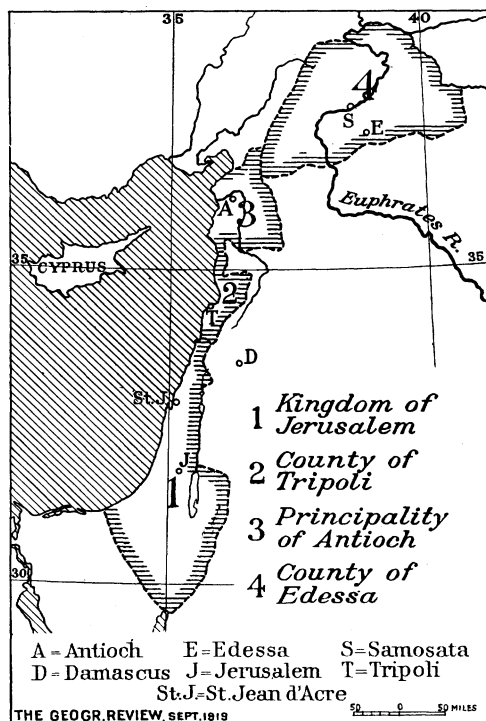


FIG. 4—(Slightly modified from Fig. 1, *Geogr. Rev.*, Vol. 1, 1916, p. 292).

Turks on the northwest. Very significantly, the Venetians, who since the Turks got astride of the Dardanelles (1356) were concentrating their trade at Alexandria and developing the Nile-Red Sea commerce with the Orient, in 1489 occupied Cyprus, apparently for nearer access to the competing piedmont route, whose outlets now were also in the hands of the friendly Egyptian government.

CYPRUS

It is a notable fact that all through history designs upon the Syrian Saddle, whether commercial or political or both, have been inaugurated or accompanied by the acquisition or occupation of Cyprus. Immediately after

and the northern ford of the Euphrates at Samosata. The Crusaders' County of Tripoli included all the old Phoenician coast land from Aradus south to Berytus (Beirut).⁸⁵ There was keen competition among the Knights of the Cross for these profitable gateways to the East, but the throne of Jerusalem went begging.

EGYPT AGAIN

It was Egypt again, under the rule of the Mameluke Sultans, who next occupied the Syrian Saddle. By 1268 they held Antioch and Aleppo to the Euphrates bend, and gradually controlled the whole saddle. For over two hundred years it was theirs, while they advanced their frontier over Cilicia to the Taurus crest as a defensive boundary against the Ottoman

⁸⁵ Shepherd, *op. cit.*, p. 68, map.

England in 1876 secured the controlling interest in Suez Canal stock through the agency of Disraeli, through the diplomacy of the same statesman she secured Cyprus (1878) and thereby control of the sea approaches to the possible Mediterranean termini of any future Bagdad railroad. The very outline of Cyprus suggests a hand pointing a pistol at the Bay of Alexandretta and the Orontes mouth.



Geographic Factors in the Ancient Mediterranean Grain Trade

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GEOGRAPHIC FACTORS IN THE ANCIENT MEDITERRANEAN GRAIN TRADE

ELLEN CHURCHILL SEMPLE

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EARLY IMPORTANCE OF THE MEDITERRANEAN GRAIN TRADE.—The grain trade of the Mediterranean region assumed peculiar importance from very early times. This was due to several causes. Population tended to concentrate on or near the coasts, where maritime conditions encouraged trade and fisheries. There population outgrew the local means of subsistence; for except in a few favored districts, the supply of breadstuffs was inadequate or was subject to fluctuations which made imports necessary. The predominant mountainous relief, thin soils of weathered limestone, the paucity of alluvial valley lands and coastal plains, the practical restriction of grain crops to the winter or rainy season, the elimination of summer crops to compensate for scant harvests from the autumn sowing, the unreliability of the fall and spring rains on which the success of the crops depended, especially in the Eastern Basin,—all combined to make the geographical distribution of grainlands a matter of immense importance in early Mediterranean history.

This was especially true of wheat. According to the ancient writers, wheat required rich, humid earth, preferably deep valley alluvium with plenty of ground water, or fertile volcanic soils retentive of moisture, like that about Naples and Syracuse.¹ Wheat was also fastidious as to its rain supply in the period of germination; this made the exact date for fall sowing a constant problem for the ancient Mediterranean farmer, who saw his hopes of harvest blasted if the

¹ Vergil, *Georgic* II, 217-224. Columella, II, 9. Theophrastus *Historia Plantarum*, Bk. VIII, ch. IX, 1, 2.

autumn showers held off a few days after he had "consigned his seed to the unwilling earth," as Virgil expresses it. The same thing is true today; the result of the harvest still depends upon the timely advent of the fall and spring rains.²

Barley, which was probably indigenous to this region, was far less exacting both as to soil and weather, and therefore better adapted to Mediterranean conditions. Hence it was widely cultivated, from sea level up to 1500 meters (4900 feet). As barley cake and barley broth, it constituted a food staple for the common people, except where the local wheat was ample or the foreign sources of grain accessible to an active merchant marine; for the cost of land carriage was generally prohibitive for this bulky commodity. The price of barley was only one-half or two-thirds that of wheat.³ This fact reflects the wide distribution of soils and climate suited to barley production, the limited total area of the wheat lands, their uneven distribution which involved heavy marine freight charges to get the product to the best markets, and finally the relatively greater demand for the choicer grains with the advance of civilization. Barley was the earlier and probably the aboriginal cereal in the Mediterranean lands. Wheat is mentioned only three times in the Iliad and six times in the Odyssey a century or more later; but barley in many varieties is frequently mentioned in Homer.⁴ The early worship of Demeter at Eleusis in the only fertile alluvial plain of Attica and at Pyrasus in the old lacustrine basin of Thessaly point to the introduction of wheat culture in those districts.⁵ The sacrificial bread in religious ceremonies of Greece and Rome was always barley cake, evidence of the primitive use of barley as opposed to wheat. In the time of Cato, however, the cereals cultivated in Italy were chiefly spelt (*far* or *ador*) and wheat, with some barley and millet.⁶

Oats and rye were unsuited to Mediterranean tillage owing to insufficient moisture, though fodder crops of rye were raised in a few northern localities with ampler rainfall and abundant ground water. Millet and panic, which required both heat and moisture, found ideal conditions in the irrigated fields of the Nile valley and the Cilician lowland,⁷ where they were grown extensively. In other parts of the Mediterranean basin they were spring crops; were planted at the vernal equinox, thrived with but little irrigation, and matured after a short

² A. Philippson, *Das Mittelmeergebiet*, p. 167. Leipzig, 1907.

³ Polybius, *Histories*, Bk. II, 15; Bk. XXXIV, 7, 8. Boeckh, *Public Economy of the Athenians*, pp. 128-131. Trans. from the German. London, 1857.

⁴ T. D. Seymour, *Life in the Homeric Age*, p. 328. New York, 1907.

⁵ Iliad, II, 695. Hymn to Demeter in the *Homeric Hymns*.

⁶ Mommsen, *History of Rome*, vol. III, p. 66. New York, 1905.

⁷ Xenophon, *Anabasis*, Bk. I, ch. II, 23.

growing period.⁸ Millet and panic kept well and were used for bread or porridge, to a limited degree in ancient Greece,⁹ but more extensively in Cisalpine Gaul, because the water supply and occasional summer showers of the Po valley insured abundant millet crops.¹⁰

Owing to conditions of climate and relief, and to the geological composition of the soils, wheat lands were sparsely distributed and, with a few exceptions, limited in area. Narrow alluvial valleys or lacustrine plains yielded enough wheat for the local demand where the population was small, as in ancient Boeotia, or was satisfied with a predominant barley diet, as in the retarded parts of Greece and Italy. Regions of large wheat production were widely separated, while population tended to pronounced concentration around the big industrial and commercial cities of the Mediterranean littoral, whose advanced culture was associated with fastidious palates demanding wheat as opposed to the widespread plebeian barley. The grain trade was therefore mainly wheat trade. Rarely were generous wheat lands and dense populations contiguous; but markets for the one and bread-stuffs for the other were provided by the navigation early developed in this enclosed sea by a fortunate combination of geographic conditions. The districts of big wheat production were Egypt and the Pontic coastlands, which lay outside the Mediterranean climatic region, the Hauran, lowland Cilicia, Thrace, Sicily, parts of Italy, Spain, Numidia and Carthaginian Africa. These raised a sufficient surplus to maintain an export trade, which fluctuated with crop conditions in other parts of the Mediterranean Basin.

CONDITIONS OF NAVIGATION AFFECTING THE GRAIN TRADE.—Local production of wheat, however, was everywhere common. It utilized small fertile fields or even mediocre soils, where the seed had to be thinly planted and the harvest was correspondingly meagre. This was due to the fact that the chief importing centers got their foreign wheat from overseas, and that the period of navigation, when such imports could be made, was limited to the four and a half months between early May and the fall equinox. Even this short term was sometimes curtailed by the early advent of autumnal storms. Moreover communication along the sea-lanes was liable to interruption in time of war, as when the Spartan fleet during the Peloponnesian war seized the Boeotian grain ships, laden with Thessalian wheat, as they emerged from the port of Pagasae;¹¹ or when Sparta in the Peloponnesian

⁸ Theophrastus, *De Causis Plantarum*, Bk. IV, ch. VII, 2. *Historia Plantarum*, Bk. VIII, ch. I, 1-4; ch. VII, 3; ch. XI, 1.

⁹ Naumann and Partsch, *Physikalische Geographie Griechenlands*, p. 446, Breslau, 1885.

¹⁰ Strabo, Bk. V, ch. I, 12.

¹¹ Xenophon, *Hellenes*, Bk. V, ch. IV, 56.

war and Philip in the Macedonian wars intercepted the foreign wheat cargoes bound from various points to Athens; or when Agathocles of Syracuse in 310 B. C. understood to break up the importation of wheat into the rival state of Carthage from Sicily and Sardinia.¹²

Piracy also was a recurrent threat to the wheat trade. This threat was particularly ominous to small islands like Rhodes and Aegina, which constantly took a hand in the suppression of piracy, not only to save their commerce but to supply the home grain markets. Even Rome suffered. For years before Pompey's dictatorship of the Mediterranean in 67 B. C., the depredations of the pirates on the Roman grain ships caused serious scarcity of provisions in the capital and other parts of Italy which relied upon foreign wheat. Circumstances of weather or war, therefore, which cut off the oversea supply of wheat, encouraged the production of home-grown grains to serve in an emergency. Moreover the cost of sea transportation left the local grain a margin of profit, which probably covered the cost of labor and fertilizer necessary to maintain the productivity of the home fields; for the transport vessels were small, the crews were large owing to the need of oarsmen to propel the ship when the course lay in the teeth of the Etesian winds, the voyages were long and slow, and the interest on borrowed capital for such ventures was high, in Athens often 30 per cent.

GRAIN TRADE OF THE LEVANTINE SEA.—In the Eastern Basin of the Mediterranean, about the Levantine Sea, the grain trade originated at a very early date, owing to the scant and uncertain rainfall. The Nile valley raised irrigated crops of wheat and barley, and, by 1500 B. C., probably durra or black millet¹³ far beyond the needs of the local population. Therefore Egyptian wheat figured in the caravan trade with Palestine from patriarchal times during the not infrequent years when drought brought famine or scarcity to Judea and Israel. Palestine raised barley on its infertile limestone highlands; but it seems to have drawn its wheat chiefly from the abundant supplies of the Hauran, the ancient Bashan. This is a high plateau (600-700 meters elevation) east of the upper Jordan and the Lake of Galilee. The west winds from the Mediterranean bring it an average of 400 mm. of rain in winter and early spring, just enough for wheat, supplemented by the considerable dews. In antiquity, judging from numerous ruins of aqueducts and reservoirs, the inhabitants conserved the water draining from the lofty Mount Hauran (1800 meters) on the east, and in dry years distributed it by irrigation canals over the

¹² Diodorus Siculus, Bk. XXI, fragment 12.

¹³ A Erman, *Life in Ancient Egypt*, p. 434. London, 1894.

tilled land, as the people do to-day.¹⁴ The Hauran is an old volcanic district; its soil consists of disintegrated lava, rich in plant food and retentive of moisture, overlying the limestone which elsewhere in Palestine forms the surface rock.¹⁵ The Hauran was therefore the granary of Syria, probably the source of the wheat which in ancient times was exported from Palestine to Tyre¹⁶ and even to Greece.¹⁷

The terraced slopes of Phoenicia were better adapted to gardens, vineyards and orchards than to field agriculture. Hence the populous commercial cities of the Lebanon coast drew upon the wheat of the Nile valley in their extensive exchanges with Egypt, and probably also from the wide and well watered alluvial plain of lowland Cilicia, where they seem to have maintained colonies at an early date, till dislodged by the expanding Greeks. Cilicia was famous for its grain fields in the time of Xenophon,¹⁸ and to-day it raises cereals as winter crops on its 1200 square miles of tilled land.¹⁹ Near-by Cyprus, which in antiquity had a reputation for fertility, produced enough wheat on the alluvial floor of its broad intermont valley to supply the local demand in the time of Strabo,²⁰ and occasionally for export, for Athens bought Cyprian grain.

GRAIN TRADE OF THE AEGEAN COASTLANDS OF ASIA MINOR.—The western front of Asia Minor, which took so active a part in ancient Hellenic life, had grain enough and to spare. The old Aegean folded mountains of Mysia and Hellespontine Phrygia, and the crystalline mass of Lydia and northern Caria are all overlaid with late Tertiary deposits and volcanic outflows, which have contributed important elements of fertility to the silted floors of the subsidence valleys penetrating inland from the embayed coast.²¹ The alluvial plains of the Scamander, Caicus, Hermus, Cayster and Meander rivers all had a reputation for fertility in ancient times²² which made them constant objects of conquest.²³ They yielded wheat crops which were further aided by a favorable climate.²⁴ The Aegean winds distribute moderate

¹⁴ Ewald Banse, *Die Türkei*, pp. 353, 357, 358. Braunschweig, 1917.

¹⁵ D. G. Hogarth, *The Nearer East*, pp. 66, 136, 188. London, 1902. E. Huntington, *Palestine in Its Transformation*, pp. 31, 230-235. Boston, 1911.

¹⁶ I Kings, V, 11. Ezekiel, XXVII, 17.

¹⁷ Theophrastus, *Historia Plantarum*, Bk. VIII, ch. IV, 3. Varro, *Rerum Rusticarum*, I, 44.

¹⁸ Xenophon, *Anabasis*, II, 23.

¹⁹ E. Banse, *Die Türkei*, p. 176. 1917.

²⁰ Strabo, XIV, ch. VI, 5.

²¹ E. Banse, *Die Türkei*, pp. 124-140. 1917.

²² Herodotus, I, 149.

²³ Strabo, Bk. VIII, ch. IV, 6; Bk. XII, ch. IV, 4; Bk. XIII, ch. IV, 2, 5, 13.

²⁴ Vergil, *Georgic* I, 103. Herodotus I, 142.

rains (500 to 650 mm.) for 60 miles inland.²⁵ Caria south of the Meander valley floor is a mountainous land of bare crystalline rock, poor thin soil, and a pronounced Mediterranean climate with six months of summer drought. The inhabitants of this coast were forced to seek foreign foodstuffs and to follow commercial vocations;²⁶ hence the maritime trade of Cnidos and Halicarnassos. The mountain land of Lycia is dissected by gorges, which open on the coast into deltaic flats at the head of protected bays. These small alluvial areas and certain limited lacustrine basins of late Tertiary deposits far up in the mountains furnished the rich "wheat-bearing tilth" of Lycia which Homer praised.²⁷ It was a self-sufficing land, condemned to isolation, which was reflected in the characteristically detached life and peculiar culture of the people.

The populous Hellenic cities, distributed along the Aegean coast and off-shore islands of Asia Minor, absorbed the surplus grain of the inland states, when they could get it, and reached out overseas for more. They occupied narrow coastal strips, small islands and peninsulas with limited area and mountainous relief. Only Naxos, Samos and Lesbos had a little level land which gave them a reputation for fertility.²⁸ The island cities at times, by a recognized law of anthropogeography,²⁹ acquired territory on the opposite coast to extend their land base, as did Samos, Rhodes, Chios and Mytilene.³⁰ Chios secured a foothold on the Mysian littoral by a shady transaction which gave it Atarneus,³¹ market for the grain of the fertile Caicus valley. Mytilene levied on this same Caicus wheatland during the Persian War.³²

The Hellenic cities, however, were often excluded from the neighboring grain markets by wars waged by the alien inland powers of Asia Minor for the conquest of the Aegean littoral. Hence in their food quest, which was always combined with various commercial enterprises, they turned their ships to the wheat fields of Egypt, the Pontic coastlands of Scythia (Russia), the broad Quaternary plain of eastern Thrace, and the volcanic soils of Sicily. On the coasts of these corn countries they planted colonies as export points for the productive hinterland. A significant connection existed between soil and this

²⁵ E. Banse, *Die Türkei*, pp. 124-125. 1907.

²⁶ *Ibid.*, pp. 125, 142.

²⁷ *Iliad*, XII, 314-315; XVI, 672-673, 682.

²⁸ Herodotus, V, 31. Strabo, Bk. XIV, ch. I, 14, 15.

²⁹ E. C. Semple, *Influences of Geographic Environment*, pp. 252-253, 444-445. New York, 1911.

³⁰ Herodotus, III, 39; I, 160. Strabo, XIV, ch. I, 33; ch. II, 2. Thucydides, III, 50; IV, 52.

³¹ Herodotus, I, 160; VIII, 106.

³² Herodotus, VI, 28.

class of settlements. In some cases the Greek colonists helped cultivate the land; in others, they bought the produce of the native population. They also established settlements at strategic points along the sea routes to the grainlands to maintain the line of communication. These way-stations developed a middleman grain trade, owing to the great length of the sea routes and the short duration of the sailing season.

Looking at the evidence, we find that eleven Hellenic cities of the Asia Minor littoral and offshore islands participated in the trading colony of Naucratis on the Canobic arm of the Nile. These cities were Mytilene, Phocaea, Chios, Clazomenae, Teos, Samos, Miletus, Halicarnassos, Cnidos, Rhodes and Pharselis, besides the Greek island city of Aegina.³³ The Aeolian settlements of this coast, whose land enjoyed an exceptional reputation for fertility,³⁴ had only one representative in the Egyptian enterprise, namely Mytilene, which shared the island of Lesbos with five other city-states. Mytilene was also interested in the Pontic fields, whence it imported wheat.³⁵ It occupied and fortified Sigeum at the entrance to the Hellespont as early as 600 B. C.,³⁶ and later built Aenos near the mouth of the Hebrus River³⁷ (Maritza), which was the Aegean port for the Thracian wheatlands.

The Ionian Miletus, a populous industrial city, took the lead in colonizing the remote Pontic wheatlands by founding Olbia near the confluence of the Bug and Dnieper rivers, and Panticapaeum on the Crimean Bosporus.³⁸ On the opposite shore of the Strait, Ionian Teos founded Phanagoria. To secure her lines of communication with the Pontic markets, Miletus planted colonies along the Hellespont and Propontis, either alone or assisted by other Ionian towns like Clazomenae, Phocaea and Erythrae.³⁹ Clazomenae regularly imported its wheat,⁴⁰ and doubtless the others did also. On the Thracian shore of the Propontis, Samos founded a colony at Perinthus, which became an export point for Thracian grain. The islands of Rhodes, Chios and Cos were especially active in the Pontic trade, and therefore participated in all Hellenic movements, military or political, to maintain a free passage for merchant ships through the Bosporus and Hellespont.⁴¹ Rhodes turned also to the grain fields of distant Sicily, and

³³ Herodotus, II, 178.

³⁴ Herodotus, I, 149.

³⁵ Thucydides, III, 2.

³⁶ Herodotus, V, 94.

³⁷ Strabo, Fragment 52.

³⁸ Strabo, Bk. VII, ch. III, 17; ch. IV, 4.

³⁹ J. B. Bury, *History of Greece*, p. 92. London, 1909.

⁴⁰ Aristotle, *Economics*, Bk. II, ch. XVII.

⁴¹ Polybius, IV, 46, 47, 52. Bury, *History of Greece*, pp. 722-723. 1909.

founded there the colony of Gela on the margin of a fertile plain,⁴² about 688 B. C. After the Roman conquest of Sicily, Rhodes secured a permit to export annually 150,000 bushels of Sicilian wheat.⁴³ It is a significant fact, too, that the Ionian cities of Asia Minor, when threatened with destruction by the Persians, discussed a recurring project to abandon their homes and settle in Sardinia.⁴⁴ They were undoubtedly attracted by the security of an island location; but their anticipations of a prosperous future in Sardinia were probably based upon mariners' accounts of the rich valley soil and excellent wheat land of the island.

THE LIMITED GRAIN LANDS OF GREECE.—Greece was scantily supplied with wheat land, owing to its small area, rugged relief, narrow alluvial valleys, and prevailing infertile soils produced by the weathering of Cretaceous limestones and crystalline rocks. The later Tertiary deposits, whose easily weathered marls made good tillage land, were limited in extent, but they contributed much to the fertility of the valleys of Laconia, Messenia and Elis.⁴⁵ The rivers of Greece, being mostly torrents, deposited in their deltaic plains chiefly coarse detritus unfit for tillage. Only a few longer streams, with a well-developed lowland course, afforded the alluvial flats of rich deep soil suitable for wheat fields; yet even these strike the modern traveller as pitifully small. The river plain of Argos, praised by Homer, comprises about 30,000 acres, yet it offered the only local wheat land for three cities,—Argos, Mycenae and Tiryns, besides the seaport of Nauplia. On the other hand, barley, which yielded a fair crop even from poor soil, was widely cultivated, and formed the main diet of the people. Barley bread and barley stew, supplemented by cheese, fruit and wine, constituted the public meals at Sparta in the time of Lycurgus.⁴⁶ Wheat bread was a delicacy served as dessert. In early Attica it was eaten only on feast days, till the development of maritime trade made it a commonplace.⁴⁷

Laconia, "lying low among the rifted hills" as Homer described it, was a rugged country suited chiefly for barley culture. Its wheat, which was light in weight and poor in food value,⁴⁸ was probably grown only in the narrow valley plain of the Eurotas River. Messenia,

⁴² Herodotus, VII, 153. A. E. Zimmern, *The Greek Commonwealth*, p. 66, 1911.

⁴³ Polybius, XXVIII, 2.

⁴⁴ Herodotus, I, 170; V, 124.

⁴⁵ Naumann and Partsch, *Physikalische Geographie Griechenlands*, pp. 347-348. Breslau, 1885.

⁴⁶ Plutarch, Lycurgus, VIII.

⁴⁷ W. Richter, *Handel und Verkehr der wichtigsten Völker des Mittelmeers im Altertum*, p. 94. Leipzig, 1886.

⁴⁸ Theophrastus, *Historia Plantarum*, Bk. VIII, ch. IV, 5.

which comprised the broad and fertile Macaria plain at the head of the Messenian Gulf, was accessible to the rain-bearing winds from the west and was watered by numerous streams. Its soil, described by a Spartan poet as "good to plant and good to ear," enjoyed a rare reputation for productivity from very early times.⁴⁹ This aroused the cupidity of over-crowded Sparta, which in the seventh century B. C. annexed Messenia after a series of wars, and thereby supplied three thousand young Spartans with new land allotments.⁵⁰ Yet wheat remained scarce, and even the local barley crops yielded no margin for times of stress. During the Peloponnesian War, Sparta relied on wheat from Sicily; Athens, to check this trade, sent a fleet in 427 B. C. against Syracuse, the chief export point.⁵¹ During the war of Agesilaus of Sparta against Persia, a flotilla of wheat transports bound from Egypt to Laconia was intercepted in 395 B. C. by the Athenian fleet, then an ally of Persia.⁵²

Elis doubtless supplied the local demand for grains from its fertile and fairly ample coastal plain, which was overlaid by late Tertiary marls,⁵³ enriched by the alluvial deposits of the Peneus and Alpheus Rivers, and adequately watered by the western rains; for the Elians seem to have taken no part in the grain trade. Achaia, on the other hand, which occupied the steep northern escarpment of the Arcadian highland and had only small fragmentary alluvial flats along the Corinthian Gulf, was early driven to colonize Zakynthos, famous for its fertility,⁵⁴ and also the small but rich alluvial plains of Sybaris and Metapontum in Southern Italy, where essentially agricultural states developed.⁵⁵ The deltaic lowland of the Cratis River at Sybaris gave the largest yield of wheat *per jugerum* in all Italy,⁵⁶ and with the Metapontum fields was perhaps the first part of Italy to raise grain for export.⁵⁷ Corinth,⁵⁸ Megara⁵⁹ and Aegina, owing to small area, poor soil and rugged relief, despite careful methods of tillage, were forced to import grain, though little Aegina raised good crops of barley.⁶⁰ Therefore Corinth, expanding early, occupied points in southern Acarnania along the Achelous River, whose alluvial plain,

⁴⁹ Odyssey, III, 495. Tyrtæus in Strabo, Bk. VI, ch. III, 3. Euripides in Strabo, Bk. VIII, ch. V, 6. Bury, *History of Greece*, p. 127. 1909.

⁵⁰ Ernst Curtius, *History of Greece*, vol. I, pp. 227-230. New York, 1872.

⁵¹ Thucydides, III, 86.

⁵² Bury, *History of Greece*, p. 539. 1909.

⁵³ Naumann and Partsch, *Physikalische Geographie Griechenlands*, p. 348. 1885.

⁵⁴ Pliny, *Historia Naturalis*, IV, 54.

⁵⁵ Bury, *History of Greece*, pp. 103, 105. 1909.

⁵⁶ Varro, *Rerum Rusticarum*, Bk. I, 44.

⁵⁷ Mommsen, *History of Rome*, vol. I, p. 171. New York, 1905.

⁵⁸ Strabo, Bk. VIII, ch. VI, 23.

⁵⁹ A Philippson, *Der Peloponnes*, pp. 16-18. Berlin, 1892. Strabo, Bk. IX, ch. I, 6.

⁶⁰ Herodotus, VII, 147. Strabo, Bk. VIII, ch. VI, 16.

abounding in grain and timber, supplied the most urgent needs of this populous commercial city.⁶¹ Corinth also colonized Potidaea on the Pallene peninsula of southern Macedonia, accessible to a region which produced grain, fruit and timber.⁶² Megara secured a colonial foothold near the Sicilian grain fields at Megara Hyblaea, and near those of Thrace by founding Selymbria on the Propontis. She anticipated Miletus in seeking the Pontic wheat markets, for as early as 660 B. C. she insured her access to the Euxine by colonizing Chalcedon and Byzantium, the two warders of the Bosphorus. The grain ships which Xerxes in 480 B. C. saw sailing through the Hellespont "on their way to Aegina and the Peloponnesus" were probably destined in part for Megara and Corinth.⁶³ Aegina's imports from Egypt through the station at Naucratis doubtless included Nile valley wheat, as well as some of the small wares which she hawked about the eastern Mediterranean.

Hellas or Central Greece had a poor reputation among the ancients for fertility,⁶⁴ and northern Greece was little better. In Homeric times rugged Epirus, inhabited by the Thesprotians, drew supplies from "the grain fields of Dulichium," probably one of the deposit islands near the mouth of the Achelous River.⁶⁵ Wheat lands existed only in small detached districts, as in the Achelous lowland and the valley plain of the Sperchius River, which was considered fertile in Homeric times. The plain of Opuntian Locris and the Crissian plain of rugged Phocis were fertile, but minute. The latter, which would make a good-sized American farm, was dedicated to the shrine of Apollo at Delphi; but it was so rare a bit of tillage land that the neighboring hill-towns of Crissa and Amphissa could not resist the temptation of cultivating it for their own use, and thus brought on the Sacred Wars.⁶⁶

GRAIN PRODUCTION IN ATTICA.—Attica had the poorest soil of all Greece. The land was so unproductive that it attracted no invaders, Thucydides tells us.⁶⁷ The little Eleusinian plain sacred to Demeter, who here introduced the cultivation of cereals,⁶⁸ a few districts in the valley of the Cephissus, and the small alluvial Marathon plain alone could claim fertility. These must have produced Attica's meager wheat crop. According to the Eleusinian inscription of 328 B. C. the average

⁶¹ Strabo, Bk. X, ch. II, 3, 4. E. Curtius, *History of Greece*, vol. I, p. 290.

⁶² Livy, XLV, ch. 30.

⁶³ Herodotus, VII, 147.

⁶⁴ Herodotus, III, 106.

⁶⁵ Odyssey, XIV, 335. Strabo, Bk. X, ch. II, 13-19.

⁶⁶ Bury, *History of Greece*, pp. 159, 724-725. 1909.

⁶⁷ Thucydides, I, 2, 5.

⁶⁸ Homeric Hymns, Hymn to Demeter.

yield of wheat was only one-tenth that of barley.⁶⁹ The wheat moreover was light and poor in food value.⁷⁰ The barley was excellent; it was the only cereal that could thrive on the porous red soil of weathered limestone and the residuum of weathered crystalline rock, which covered the surface of the Mesogaea or "Midlands" with mediocre soil.⁷¹ A meager average rainfall of 408 millimeters (16 inches), which drops at times to 325 millimeters (13 inches), further reduced the productivity of this ungenerous land.

Athens like Sparta undertook at an early period to despoil some of her neighbors of their best grain land; but these territorial acquisitions were necessarily small. In 506 B. C. she took from Chalcis the fertile Lelantine plain on the neighboring coast of Euboea, and settled there 2000 Athenian colonists to secure her hold; about the same time she seized from Eretria the little deltaic plain of Oropus at the mouth of the Asopus River. This little garden spot had long been a bone of contention between Eretria and Boeotia, whose border it adjoined; and it came to be a chronic cause of enmity between Boeotia and Athens.⁷² The small area of these acquisitions emphasize the urgency of Attica's need. The Lelantine wheat fields were vital to Athens as her nearest source of supply. Hence during the Peloponnesian War, the occupation of Decelea by the Spartans in 413 B. C. enabled the invaders to control the road across northern Attica, and thus crippled Athens by cutting its communication with Oropus and the Euboean granary.⁷³ The great Athenian expansionist Alcibiades⁷⁴ urged the expedition for the conquest of Sicily (415 B. C.), on the ground of the abundant wheat, barley and other food-stuffs of the island. Nicias, arguing against the expedition, said:—"The Sicilians have a numerous cavalry and grow their own wheat instead of importing it; in the last two respects they have a great advantage over us."⁷⁵ To the Athenian statesmen, the inadequate grain supply was a constant handicap. This weakness had to be counterbalanced by the development of extraordinary strength in other directions. Climate, soil, small area, a long indented coast line, and a commanding central location in the Eastern Basin of the Mediterranean, all combined to force Athens into a brilliant industrial and maritime development. This enabled the state in the age of Pericles to support a population of 250,000, one-half of them slaves, on its scant 700 or

⁶⁹ T. D. Seymour, *Life in Homeric Greece*, p. 328. New York, 1907.

⁷⁰ Theophrastus, *Historia Plantarum*, Bk. VIII, ch. IV, 5.

⁷¹ Naumann and Partsch, *Physikalische Geographie Griechenlands*, p. 347.

⁷² Bury, *History of Greece*, pp. 217-218. 1909.

⁷³ Thucydides, VII, 27, 28; VIII, 95, 96.

⁷⁴ Plutarch, *Alcibiades*, XVI.

⁷⁵ Thucydides, VI, 20.

750 square miles of area.⁷⁶ Boeckh's estimate of half a million population is excessive, because he grossly overestimates both the fertility and arable area of Attica.⁷⁷

Only two states of Greece, Thessaly and Boeotia, raised an ample supply of wheat; Thessaly alone produced a margin for export.⁷⁸ Its extensive lake plains were famous for their fertility from Homeric times.⁷⁹ The large area and abundant resources of the land were the geographic foundation of Jason's ambition to make himself master of Greece and the neighboring countries.⁸⁰ Generous nature enabled the inhabitants to display a munificent hospitality and develop voracious appetites; "a Thessalian mouthful" was proverbial in Greece.⁸¹ Boeotia was a small state, but it had productive wheat fields and gardens distributed in the lacustrine plains of Lake Copais and Lake Hylica and along the valley of the Cephissus. Fertile soil made the Boeotians a nation of farmers, unenterprising and stolid, but the best fed people of Hellas.⁸² The Athenians regarded them with scorn, not unmixed with envy, because of their voracity; and indeed this characteristic made them the butt of the comic writers of Greece. One such humorist, when asked what sort of people the Boeotians were, replied that "they spoke just as vessels might be expected to speak if they had a voice, telling how much each of them could hold."⁸³

The Boeotian wheat, according to Theophrastus, was the heaviest and best of the whole Mediterranean region, superior to the Libyan, Pontic, Thracian, Syrian, Egyptian and Sicilian, which in turn was the heaviest of all imported wheats. In proof of his contention, Theophrastus adduced the fact that the Boeotian athletes, who at home ate scarcely three pints of the native wheat a day, easily consumed five pints of Attic wheat when they were staying in Athens.⁸⁴ The Athenian wheat therefore seems to have ranked low in food value. The superiority of the Boeotian wheat persisted; when later it entered the grain market of Rome, probably as tribute, it yielded only to the very best Italian product, according to Pliny.⁸⁵ There is no evidence however, that the Boeotian grain was exported even across the border into Attica. It was doubtless absorbed by the home market.

⁷⁶ Bury, *History of Greece*, p. 378, note p. 870. 1909.

⁷⁷ Boeckh, *Public Economy of the Athenians*, pp. 50-57, 107-114. London, 1857.

⁷⁸ Xenophon, *Hellenes*, Bk. V, ch. IV, 5, 6; Bk. VI, ch. I, 11.

⁷⁹ *Iliad*, II, 695. Thucydides, I, 2, 3. Strabo, Bk. IX, ch. V, 2, 19.

⁸⁰ Xenophon, *Hellenes*, Bk. VI, ch. I, 8-18.

⁸¹ *Ibid.*, Bk. VI, ch. I, 3. Athenaeus, X, 12.

⁸² E. Curtius, *History of Greece*, Vol. IV, pp. 349-352. New York.

⁸³ Erastosthenes, quoted in Athenaeus, X, 11.

⁸⁴ Theophrastus, *Historia Plantarum*, Bk. VIII, ch. IV, 5.

⁸⁵ Pliny, *Historia Naturalis*, XVIII, 7.

EARLY DEVELOPMENT OF THE GREEK GRAIN TRADE.—Poverty of wheat land in Greece necessitated the importation of breadstuffs from the earliest times. Even the most fertile districts, owing to small area, had no surplus for emergencies. These emergencies, moreover, recurred, owing to the variable rainfall and frequent wars between the city-states, with the consequent devastations of the fields in the spring campaigns and interruption to tillage by military service. During the Peloponnesian War, Boeotian Thebes sent ships to Pagasae to buy Thessalian wheat, because for two years its land had remained uncultivated.⁸⁶ Preliminary to its revolt from Athens in 428 B. C. Lesbos made extensive importations of grain and other supplies from the Pontic coasts.⁸⁷ When the Persian invasion threatened Greece in 480 B. C., Gelon of Syracuse, foreseeing that the Pontic and Egyptian wheat ships bound for Greece would be intercepted by the enemy's fleets, offered to supply Sicilian grain for the entire Hellenic army, and to send a large naval and military force, on condition of his getting the supreme command of the allied forces.⁸⁸ This offer points to a long established wheat trade between Sicily and Greece. It also suggests a fact which impresses the investigator in this subject;—namely, that in the ancient Hellenic world wheat was the most important contraband of war.

Constant concern for their breadstuffs, especially wheat, harrassed all the Greek states of the mainland and islands except Boeotia, Thessaly and backward mountain communities like the Arcadian commonwealths, whom nature had long disciplined to an abstemious contentment with the local barley and acorns. This concern stimulated the maritime trade and colonial enterprises of all the distinctly commercial states, whose development was determined by the pull of ready access to the sea and the push of meager tillage land at home.⁸⁹ Their governments became the chief *entrepreneurs* in the grain business, because private capital, nervous over the big risks taken by the grain fleets, was limited, and therefore voracious as to profits; transportation facilities were restricted and unreliable; and food supply at any crisis became a national question.⁹⁰ Foreign grain markets had to be kept open by reciprocity treaties, and distant grain lands linked with Greece by seaboard colonies. These colonies duplicated the types which emanated from the Hellenic cities of the Asia Minor coast. They were agricultural, like Achean Sybaris and Metapontum on the delta

⁸⁶ Xenophon, *Hellenes*, Bk. V, ch. IV, 56.

⁸⁷ Thucydides, III, 2.

⁸⁸ Herodotus, VII, 158.

⁸⁹ E. C. Semple, *Influences of Geographic Environment*, pp. 15, 268. 1911.

⁹⁰ W. L. Westerman, *Decline of Ancient Culture*, *Amer. Hist. Review*, Vol. XX, p. 736. 1915.

lands of the South Italian littoral, and the Athenian *Thurii* near the earlier *Sybaris*, where the people "could eat bread without measure;"⁹¹ or strategic way-stations and middlemen ports, like the Athenian *Sestos* and *Cardia* on the *Hellespont*.

THE GRAIN TRADE OF ATHENS.—No other Greek state was so dependent upon foreign grain as Athens.⁹² Even the Attic farmers relied on it in part, owing to the sterility of their fields.⁹³ The literature of Athens therefore yields fairly abundant historical material on the extent and control of the grain trade, and shows what probably happened also in other Greek states which carried similar geographical handicaps, but failed to leave behind so ample a record. Grain was brought to the *Piræus* from the Pontic coast, especially the *Crimea*, from eastern *Thrace*, *Syria*, *Egypt*, *Libya*, *Sicily*,⁹⁴ and occasionally from the island of *Cyprus*. The *Libyan* wheat was doubtless the product of *Cyrenaica*, which had excellent grainland⁹⁵ and sufficient rainfall on the *Barca* plateau (1800 feet), for winter crops; but owing to the semi-arid climate and variable precipitation, the country probably raised a margin of wheat for export only in exceptional years. The same was doubtless true of *Cyprus*. This island, which normally raised only enough for local consumption, sent grain fleets to Athens in the time of *Andocides*⁹⁶ (468-400 B. C.), probably during the *Peloponnesian War*, when wheat commanded high prices.

Egyptian wheat was brought to the *Piræus* not only by Athenian merchants, but also by foreign grain dealers from *Rhodes*, *Miletus*, *Phoenicia* and *Egypt* itself.⁹⁷ *Rhodes* and *Miletus* probably bought wheat beyond their own needs at *Naucratis* on the *Nile*, and sold the surplus to their sister state Athens. During a period of scarcity in 445 B. C., the king of *Egypt* sent a present of 40,000 *medimni* of wheat to be divided among the Athenian citizens.⁹⁸ The dependence of Athens upon *Egyptian* wheat was marked. After the *Macedonian* conquest of the *Nile* valley, *Cleomenes*, governor of *Egypt*, worked great hardship against Athens and other Greek states by controlling the export of *Egyptian* wheat, both as to price and destination. He imposed high export duties and sent the grain to the best market.⁹⁹

⁹¹ Bury, *History of Greece*, p. 380. 1909.

⁹² *Demosthenes' Orations*, On the Crown, and Against *Leptines*. *Xenophon*, *Hellenes*, Bk. VI, ch. I, 11. *Diodorus Siculus*, I, 2.

⁹³ *Livy*, XLIII, 6.

⁹⁴ *Theophrastus, Historia Plantarum*, Bk. VIII, ch. IV, 5.

⁹⁵ *Strabo*, Bk. XVII, ch. III, 21. *Pliny, Historia Naturalis*, V, 5.

⁹⁶ *Boeckh, Public Economy of the Athenians*, p. 76. London, 1857.

⁹⁷ *Ibid.* pp. 110, 117.

⁹⁸ *Plutarch, Pericles*, 37.

⁹⁹ *Aristotle, Economics*, II, 34. *Demosthenes, Contre Parmenis, Oeuvres Complètes*, vol. IV, p. 229. Trans. by Abbé Auger, Paris, 1777.

Sicily was a resource for Athens when grain exports from Egypt failed, owing either to a low Nile or to excessive manipulation of the market, as in the case cited. The familiarity of Nicias and Alcibiades with the Sicilian wheat supply in 415 B. C. indicates that Athens, like Sparta, had long imported breadstuffs from that island. The Sicilian wheat was the heaviest brought into Greece, and ranked just below the native Boeotian product.¹⁰⁰ Hellenic grain ships sought the markets not only of the Greek colonies in eastern Sicily, but visited also the Phoenician ports in western Sicily. "The great advantages and profits" which they drew thence¹⁰¹ can be attributed in part to dealings in grain, for this district exported wheat to Carthage.

The Thracian wheat which Theophrastus was familiar with in Athens probably came chiefly from the Strymon Valley and the neighboring coastal plain as far as the Nessus River. This district was known in ancient as in modern times as fertile and well watered; it was rich in grain fields, forests, and gold mines.¹⁰² Athens seized the coast fortress of Eion near the Strymon mouth from the Persians in 475 B. C.; tempted by the local resources, it made an unsuccessful effort in 465 B. C. to plant a colony at the bridge of the Strymon just above Eion, where thirty years later Pericles established the thriving emporium of Amphipolis.¹⁰³ That grain formed one of the exports of Amphipolis is suggested by the fact that about 286 B. C. the king of Paenonia, a country of the upper Strymon and Axios valleys, presented 10,000 Attic medimni of grain as a gift to the Athenian citizens.¹⁰⁴ Other Thracian wheat may have come to Athens from its allies Selymbria and Perinthos, either direct or through the market of Sestos. The East Thracian fields, which were very productive,¹⁰⁵ were probably cultivated by the Hellenized natives who maintained commercial relations with the coasts, because most of the Thracians were engaged in herding in the time of Herodotus.¹⁰⁶

Importance of the Pontic Markets.—The northern coastlands of the Pontus Euxine became Attica's chief source of wheat, though other Hellenic states were the pioneer traders on those remote shores. The Hellespontine policy of Pisistratus indicates that Athens began her commercial ventures there at the beginning of the sixth century B. C. Her maritime empire established in the age of Pericles drew all the Hellenized shores of the Euxine into her alliance, and opened every

¹⁰⁰ Theophrastus, *Historia Plantarum*, Bk. VIII, ch. IV, 3.

¹⁰¹ Herodotus, VII, 158.

¹⁰² Pliny, *Historia Naturalis*, XLV, 30. Strabo, Bk. VII, ch. VII, 5; Fragment 36.

¹⁰³ Bury, *History of Greece*, pp. 336, 382. 1909.

¹⁰⁴ Boeckh, *Public Economy of the Athenians*, p. 124. 1857.

¹⁰⁵ Aristotle, *Economics*, II, 27.

¹⁰⁶ Herodotus, V, 6.

port to her trade. Pericles toured this northern sea to consolidate commercial and political relations by a display of Athenian naval power;¹⁰⁷ for the growth of Athens necessitated increased grain and wood imports from the Pontic shores. In the time of Demosthenes, Leucon, King of the Crimean Bosphorus, supplied Athens yearly with 400,000 medimni (600,000 bushels), or nearly half its total annual import of grain.¹⁰⁸ The total import was therefore over 800,000 medimni or 1,200,000 bushels. One year, however, probably in 360 B. C. during the famine of the 105th Olympiad when, as Demosthenes implies, the grain shipments from Theodosia were extraordinarily large, Leucon shipped to Athens 2,100,000 medimni or 3,150,000 bushels.¹⁰⁹

While the official dealings of Athens were largely with the Crimean grain market of Theodosia, wheat was brought to the Piræus by foreign merchants from the wide plains of the Dnieper (Borysthenes) and Bug (Hypanis). On the peninsula formed by the confluence of these two rivers stood a temple of Ceres, a seamount on this low coast pointing the way to the grain market of Olbia, which was founded by Miletus and became a wealthy city like the modern Odessa. The Greeks considered the Dnieper district comparable to the Nile valley in productivity.¹¹⁰ On the Dniester they founded the colony of Tyras,¹¹¹ doubtless as a wheat port. The work of tillage was done by Scythian nomads, who became partly Hellenized and settled down to cultivate land for the Greek grain fleets.¹¹² This Pontic wheat included a hard spring wheat and a soft, light winter wheat. Theophrastus states that both a winter and spring sowing of all grains were made in that country; but as he describes the Pontic wheat in general as very light, importations of winter wheat must have predominated.¹¹³ It therefore came chiefly from the southern and western grain fields of the Pontic littoral, for these are the only sections which to-day have enough snow to blanket the winter fields.

The Pontic coast lands offered profitable fields of trade to the industrial and commercial cities of the Aegean. They were a sparsely populated region of raw production, abounding in the produce of forest, field, pasture and fishing grounds. They yielded not only cereals in abundance, but cattle, hides, wool, salt fish, and timber from the Caucasus. For these the Greek city-states, commanding at home scant wheatlands, scant forests, scant pasturage, exchanged the finer products of the south,—olive oil, wines, potteries, woollen goods and clothing.

¹⁰⁷ Plutarch, Pericles, XX.

¹⁰⁸ Demosthenes, *Contre Leptines*, *Oeuvres Complètes*, vol. III, p. 9. Paris, 1777.

¹⁰⁹ Strabo, Bk. VII, ch. IV, 6.

¹¹⁰ Herodotus IV, 53, 78. Strabo, Bk. VII, ch. 3, 17.

¹¹¹ Herodotus, IV, 51.

¹¹² Herodotus, IV, 17, 18.

¹¹³ Theophrastus, *Historia Plantarum*, Bk. VIII, IV, 5.

Ships sailed with full cargoes on outbound and homebound voyages, and earned big profits. The Pontic shores, owing to a cold climate and to a backward civilization, afforded better selling markets than Egypt or Sicily; for Sicily, after three centuries of colonization was Hellenized on the eastern side by the time of the Peloponnesian War.

ATHENIAN CONTROL OF THE PONTIC TRADE ROUTE.—Forced by her geographic conditions into a precocious industrial and commercial development, Athens early recognized her need of these Pontic markets. About 600 B. C. she seized Mytilene's fortress of Sigeum at the entrance to the Hellespont,¹¹⁴ probably with the purpose of interfering with Megara's trade in Pontic wheat. In 535 B. C., Pisistratus inaugurated a regular Hellespontine policy aiming at access to the Euxine, and from this policy Athenian statesmen never thereafter deviated. It consisted in augmenting Athenian influence and multiplying Athenian colonies along the Hellespont, Propontis and Bosphorus, in order to control this whole strategic passage. The Delian League gave her eventual possession of Lemnos, Imbros and Tenedos, which commanded the Aegean approaches to the Hellespont, and on these islands she rarely loosened her grip. Her line of communication as far as Lemnos was maintained by control of Euboea, which safeguarded the marine Broadway of the Euboean Sound, and by the possession of the islands of Sciathos, Peparethos and rocky Halonnesos. The latter had no value except as an island way-station on the voyage to the Hellespont, though in hostile hands, like those of Philip of Macedon, it threatened the wheat track.¹¹⁵

The economic and political life of Athens depended upon her ability to maintain this line of communication; of this fact the state was vividly aware. At the close of the Persian War, Athens sent its fleet to the Hellespont and drove the enemy from Sestos (478 B. C.), which controlled the narrows of the strait, thus clearing the way for future ascendancy there.¹¹⁶ Two years later, when the Spartan Pausanias occupied Byzantium and Sestos, an Athenian fleet under Cimon promptly dislodged the intruder from both positions. After the maritime empire of Athens was established by Pericles, her enemies came to see that her vulnerable spot lay in the straits where her communication with the Pontic grain fields and forests could be most effectually interrupted. Therefore in the latter years of the Peloponnesian War, naval engagements multiplied in the Hellespont, as Athens made a fight for her life. Finally her fleet was wiped out by the Spartans in the battle of Aegospotamos near Sestos in 405 B. C. Ernst Curtius

¹¹⁴ Herodotus, V, 94, 95.

¹¹⁵ Demosthenes, Oration on Halonnesos.

¹¹⁶ Herodotus, IX, 114-118.

surmises that this battle occurred in summer, not later than August, at the peak of the season when the Pontic grain ships were hurrying south, in order to reach their home ports before the September storms should stop navigation.¹¹⁷ The Spartan Lysander probably selected the critical moment to close the Hellespont, and that with dramatic effect. The Athenian sacred galley escaped from the battle and carried the news to Athens. Xenophon describes the scene which ensued. "At Athens, on the arrival of the *Paralus* in the night, the tale of their disaster was told; and the lamentations spread from the Piraeus up the long walls unto the city, one man passing on the tidings to another; so that night no man in Athens slept."¹¹⁸

Ten years later, when Athens revived and established the Athenian Confederation (395 B. C.) to operate against Sparta, she first secured the alliance of Lemnos and Imbros, island warders of the Hellespont. In 389 B. C. she began to get control over the sea route to the Euxine by drawing into her alliance Samothrace, Lesbos, various Hellespontine cities, Byzantium and Chalcedon, and raised a revenue by imposing tolls on merchandise passing through the Bosphorus. Again the straits became the scene of hostilities between Athenians and Spartans, till in 387 B. C. the Athenian fleet was blockaded in the Hellespont and the Pontic grain vessels were cut off from the Aegean.¹¹⁹ The second Athenian Confederacy (378 B. C.) comprised Byzantium, various Thracian cities, Lesbos, and most of the Euboean towns, all stations on the sea route to the Euxine, besides Rhodes and Chios, who as small island states were vitally interested in the Pontic trade. This time the Spartan fleet did not go so far as the Hellespont, but hovered about Aegina, Andros and Ceos, on the sea approaches to the Piraeus. There they blocked the advance of the grain ships, which had reached the southern end of Euboea, and prevented their rounding Cape Sunium, till the Athenians fitted out an emergency fleet, defeated the Spartan triremes, and brought in the grain to their starving populace.¹²⁰ The approaches to the Saronic Gulf offered many strategic points for intercepting the Athenian grain ships. Therefore Athens made Sunium a fortified naval base during the Peloponnesian War to protect this last perilous thirty-mile stretch up to the Piraeus.¹²¹ The outer seagate to the Saronic Gulf had the island of Andros and the seaport of Carystus in south Euboea as its keepers. In order to safeguard the strategic passage, therefore, almost the first act of the Delian League was to reduce Carystus in 471 B. C., and force its entry into the con-

¹¹⁷ E. Curtius, *History of Greece*, vol. III, p. 591, note XI. 1872.

¹¹⁸ Xenophon, *Hellenes*, Bk. II, ch. II, 3.

¹¹⁹ Bury, *History of Greece*, pp. 546, 550-552.

¹²⁰ Xenophon, *Hellenes*, Bk. V, ch. IV, 60-61.

¹²¹ Thucydides, VIII, 4.

federation.¹²² When Athens converted the League into an empire, she took the further precaution of settling cleruchies or out-colonists in Andros to secure the loyalty of that island (447 B. C.).¹²³

Whoever fought Athens had to strike at her overseas grain trade. Therefore her next rival, Thebes, was forced out of her normal character as a land power and assumed the novel rôle of a sea power; built a hundred triremes, and sent them to the Propontis to prey upon the Pontic grain ships (364 B. C.). While Athens from her base at Sestos endeavored to defend these, the Theban admiral adopted the obvious policy of stirring up the Hellespontine cities of the Chersonnesus against Athens, and alarming King Cotys of Thrace with predictions of Athenian conquests. Cotys seized Sestos and nearly the whole Chersonnesus in 360 B. C. His death soon after and the decline of Thebes enabled Athens to recover control of the Hellespont in 357 B. C., when she again drew Euboea into her alliance.¹²⁴ Thus, with her old possessions Lemnos and Imbros, she restored the security of the grain track from the Propontis to the Piræus, and fortified herself for her next big struggle.

Philip of Macedon was the next rival to Athens. The chief actor in the drama changes, but not the scenes or the dramatic episodes. These recur with historical monotony due to the same controlling geographic conditions. There was the same old struggle for the control of the Bosphorus, the Hellespont and the wheat emporiums of the Thracian coast,—Byzantium, Selymbria, and Perinthos. Macedon, like Thebes, was forced to become a naval power. She let loose her triremes to capture Athenian wheat transports in the north Aegean and to harry Lemnos, Imbros, and Euboea. There the Macedonian forces seized Eretria and fortified Oreus at the northern end of the island, in order to dominate the stormy and dangerous entrance into the Euboean Sound.¹²⁵ Philip's land campaigns aimed at the conquest of Thrace, from Byzantium to the tip of the Chersonnesus, where Athens was most vulnerable. He endeavored to conquer Athens in Thrace, as Napoleon endeavored to conquer England in Egypt. The arguments of Demosthenes to arouse Athens to the gravity of the danger paralleled those used in the British Parliament for the continuance of the French war. Demosthenes, enumerating his provisions for Athens' safety, gives a digest of the geography and the strategy of the war. By the recovery of lost Euboea he protected the Attic seaboard and the grain track through the Euboean Sound. Effecting the release of Byzantium, the Chersonnesus and Halonnesos from Mace-

¹²² Bury, *History of Greece*, p. 337. 1909.

¹²³ Plutarch, *Pericles* XI.

¹²⁴ Bury, *History of Greece*, pp. 615-617, 682-683. 1909.

¹²⁵ Demosthenes, *Oration on the Chersonnesus*, and *First Philippic*.

donian dominion, he opened the Hellespont and Bosphorus for the passage of the Pontic grain ships, and provided for their conveyance along a friendly coast all the way to the Piraeus. He persistently exhorted the citizens to expand and strengthen the navy, with which to guard these overseas connections.¹²⁶

THE TASKS OF THE ATHENIAN NAVY.—Athens was the Britain of the ancient Mediterranean. Its navy alone guaranteed the full loaf of bread. Fleets had to police the Pontic wheat track against the Caucasus pirates, and suppress other sea-robbers who recurrently infested the routes to Egypt and Sicily. A strong navy was necessary to check sporadic depredations on the merchant ships by rival powers even in time of peace. Chalcedon, embarrassed by an empty treasury, once utilized its location on the Bosphorus to plunder some vessels going north into the Euxine,¹²⁷ doubtless loaded with manufactured goods with which to pay for the return cargo of wheat and fish. While Philip of Macedon was besieging Selymbria in eastern Thrace, his fleet captured twenty Athenian grain ships passing through the Propontis to the Hellespont *en route* to Lemnos, because the Macedonian admiral suspected that the supplies were meant for the besieged city.¹²⁸ Again early in the reign of Alexander the Great, Pontic ships were arbitrarily seized by the Macedonians and held up at Tenedos, though freedom of the seas and security of ships against seizure had been pledged by Alexander's recent treaty with Greece. Athens' prompt equipment of a large naval fleet led to the release of the captured vessels.¹²⁹

In time of war, naval convoys attended not only the wheat fleets of Athens but those of any member of the Athenian Confederacy. For this protection an annual tribute was paid.¹³⁰ Hostile attacks were not limited to the mere seizure of food vessels. When Demetrius of Macedon was besieging Athens about 300 B. C., he captured a wheat transport bound for the Piraeus, and hanged the captain together with the pilot. This treatment so terrified the merchants that they stayed away and let Athens starve till she surrendered to Demetrius.¹³¹

COMMERCIAL TREATIES AND ALLIANCES.—At all times the gloved hand of diplomacy aided the mailed fist of the navy. In the age of Pericles, and again in the time of Demosthenes, the international policy of Athens was dominated by the economic interests of the State. In the Euxine Athens held the friendship of the Greek towns by giving

¹²⁶ Demosthenes, Oration on the Crown.

¹²⁷ Aristotle, Economics, II, 11.

¹²⁸ Demosthenes, Oration on the Crown, and the Letter of Philip.

¹²⁹ Demosthenes, Treaty of Alexander.

¹³⁰ Demosthenes, Oration on the Chersonnesus.

¹³¹ Plutarch, Demetrius, XXXIII.

them support against barbarian attacks. With the reigning house of the Cimmerian Bosphorus she maintained close relations based upon reciprocity of trade. Leucon, prince of Panticapaeum from 393 to 353 B. C., exempted Attic ships from the export duty, allowed them to purchase grain ahead of other ships, and fixed a market for them in the excellent port of Theodosia near the Crimean wheat fields.¹³² Athens convinced him that she was his best customer, and conferred honors upon him. She also cultivated friendship with the powers of the Thracian Bosphorus and Propontis; with the Persian satrap of Hellespontine Phrygia, who by reason of geographical location could imperil or police the southern strait; with the barbarian kings of eastern Thrace; and with the free cities of Byzantium and Perinthos,¹³³ who not only occupied strategic positions, but were themselves wheat emporiums.

Byzantium grew rich on her Pontic trade. It was an obvious policy for the cities of the Propontis and straits to accumulate grain, either by direct importation from the Euxine or by the levy of port dues and Bosphorus tolls, paid in kind,¹³⁴ on passing ships; they could then resell it to merchants who were unwilling to make the long voyage to the Crimea, or who arrived near the end of the sailing season and wished to return home before the autumn storms. Thus we read that Heraclea, located on the Thracian coast north of the Chersonnesus, sent forty ships to the Crimean Bosphorus to buy wheat and other supplies.¹³⁵ Sestos was called in Athens "the wheat-bin of the Piraeus,"¹³⁶ a term applicable only to a grain emporium. Its strategic location at the narrows of the Hellespont made it not only a base for military control, but also like Byzantium a natural toll station which Athens sometimes used for collecting transit dues, levied in kind, if we may judge from Leucon's export taxes on the Pontic wheat. Athens showed persistent friendship for Egypt and Cyprus by assistance rendered to these states when revolting against Persian dominion. Her motive may have been partly her old hostility to the Great King, but partly also her need of Egyptian and Cyprian grain.

GOVERNMENT CONTROL OF THE ATHENIAN GRAIN MARKET.—The grain market of the Athenian Agora, despite all government measures to insure a steady supply of wheat and barley, was sensitive to every political movement in Scythia and Thrace, to every disturbance in the towns of the Bosphorus and Hellespont. Prices fluctuated according to

¹³² Demosthenes, *Contre Leptines*, *Oeuvres Completttes*, vol. III, pp. 19-20. Paris, 1777.

¹³³ Demosthenes, *Letters of Byzantium and Perinthos* in the *Oration on the Crown*.

¹³⁴ Xenophon, *Hellenes*, Bk. I, ch. I, 22. Polybius, IV, 44, 46.

¹³⁵ Aristotle, *Economics*, II, 9.

¹³⁶ Aristotle, *Rhetoric*, III, 10.

the seasons, as these were favorable or unfavorable to crops and to navigation; they fluctuated as importations increased or diminished, as export duties were raised or lowered in the grain emporiums of the Mediterranean, and as the markets were cornered both within and without Attica and prices arbitrarily raised. War and piracy always made the grain business in the Piraeus feverish. The fluctuations, however, were not excessive except during a siege or sudden threat of war. In the time of Pericles and Socrates, the medimnus of prepared barley cost normally two drachmae or 34.2 cents, and wheat was probably a third more. In 396 B. C. wheat sold for three drachmae or 51.3 cents, and fifty years later in the time of Demosthenes for five drachmae or 85.5 cents.¹³⁷ Prices in other Greek states were about the same. At Lampsacus the normal price for a medimnus of wheat in Aristotle's time was four drachmae or 68.4 cents, but this was arbitrarily advanced by the State to six drachmae, or \$1.02 at a threat of war, doubtless as a hint for conservation.¹³⁸

The cheapest and best market in which the Athenians could buy was that of the Crimean Bosphorus. There excellent rates were given even in time of scarcity. At Olbia on the Dnieper estuary, prices were variously two, four and eight drachmae or 34.2 cents to \$1.37 in the first or second century B. C., but they must have been lower in the fifth and fourth centuries B. C. Prices in Egypt were low, reflecting the fertile soil, large arable area, cheap labor, and the relative certainty of harvest under irrigation tillage. In the time of the Ptolemies the normal price for spelt and wheat was about two drachmae or 34.2 cents the medimnus, and in times of scarcity it increased hardly threefold. Shortly after the founding of Alexandria, however, under the satrap Cleomenes, the wholesale price of wheat rose to ten drachmae or \$1.71 in a time of scarcity. Sicilian grain was doubtless cheap prior to the Roman conquest of the island. In 74 B. C., the price of wheat there was fixed at an equivalent of 91.2 cents and barley at 45.6 cents the medimnus.¹³⁹

The vicissitudes of the grain trade, due largely to geographic conditions, necessitated governmental control. Even Egypt found it necessary in years of reduced crops to prevent exports, either by direct inhibition or by imposition of enormous export duties.¹⁴⁰ Selymbria, though located in a wheat-growing district of Thrace, prohibited grain exports in time of scarcity.¹⁴¹ Athens during the Peloponnesian War employed her control of the Bosphorus and Hellespont to allow no grain

¹³⁷ Boeckh, *Public Economy of the Athenians*, pp. 128-129. 1857. Demosthenes, *Oration against Phormion*.

¹³⁸ Aristotle, *Economics*, II, 8.

¹³⁹ Boeckh, *Public Economy of the Athenians*, pp. 130-132.

¹⁴⁰ Aristotle, *Economics*, II, 34.

¹⁴¹ *Ibid.*, II, 17.

exports from the Euxine or Byzantium, except by express permission as to the destination and annual amount.¹⁴² She thus waged an economic war against her ill-fed enemies like Corinth, Megara and Sparta, and used her command of the Pontic grain as a means to hold the allegiance of her restless insular allies, like Rhodes, Cos, Chios and Lesbos.

At all times the grain trade of the Piraeus was closely controlled, as was also the sale of lumber and ship supplies; otherwise the commerce of Athens was free. The exportation of native grain from Attica was prohibited by law. Furthermore, two-thirds of every cargo of foreign grain entering an Attic port had to remain in the country. No inhabitants of Attica, whether native or alien residents, might transport grain to any other but Attic ports; nor might they so much as loan money on the security of a vessel, unless such vessel should return to Athens with a cargo of grain or other commodities. The object of these measures was to compel importations of foreign grain. Furthermore Athens appointed certain officials who kept account of the imported grain, and saw to it that two-thirds of the supply should be brought to the city from the ports. She provided public storehouses for the state-owned grain, and also for the stock of private dealers. Government commissioners purchased grain for the state, while yet others received and measured it.¹⁴³ Thus a reserve was at hand in time of emergency, to be sold to the populace at a moderate figure and to stabilize prices. Probably some of it was given to the citizens. Measures were also adopted to prevent dealers from cornering the market. Retailers might sell only at the advance of one obolus, or about three cents on the cost price of a medimnus, though in time of dearth they ran up the prices and sold at six times the legal profit. Eager to profit by every fluctuation in the market, the grain dealers spread alarming rumors to send up the price of wheat, saying that the grain ships had been wrecked in the Euxine or captured at sea by the Spartans, that commercial treaties had been violated and the grain ports closed against Attic merchantmen, with the result that the nervous populace was willing to buy at any price. To curb these enemies within the state, Athens imposed a death penalty for any effort to establish a grain monopoly.¹⁴⁴ The free foreign dealers regularly bought grain in the cheapest market and sold in the highest, and with this purpose they scoured the Aegean, the Euxine and the Sicilian coasts.¹⁴⁵ Athens made every effort to attract them to the Piraeus

¹⁴² Boeckh, *Public Economy of the Athenians*, p. 78.

¹⁴³ *Ibid.*, 78-78, 114-116, 121-123.

¹⁴⁴ Lysias, *Contre les Commerçants de Blé, Oeuvres Complètes*, pp. 304-305. Trans. by Abbé Auger, Paris, 1783.

¹⁴⁵ Xenophon, *Oeconomicus*, XX, 27-28.

market; this rich and populous state was in a position to pay well for the needed breadstuffs, but it encouraged competitive selling.

It is reasonable to suppose that other states, possessing similar geographic conditions to those of Attica, and therefore compelled to import overseas grain, adopted similar foreign and domestic policies to maintain a balance of breadstuffs and population. The abundant literature of Athens enables us to reconstruct in considerable detail the constant efforts of the state to fill its grain-bins. Megara, located astride of the Isthmus of Corinth with a port on each side, maintained connection with the Sicilian fields as well as with the Pontic wheat lands, as indicated by her colonies both in Sicily and on the Bosphorus. Corinth early in the eighth century B. C. established trade relations westward with Syracuse and other Sicilian wheat markets. Mountainous Achaia, located on the marine highway of the Corinthian Gulf¹⁴⁶ and having easy access to the west, imported grain from Sicily and doubtless also from her Italian colonies in the fertile plains of Sybaris and Croton. The island states of the Aegean, like Rhodes, Chios and Cos, seem to have relied chiefly on the Pontic grain. They therefore rushed to the support of Athens whenever the Euxine connection was jeopardized. Their interests were identical, and therefore they were nearly always members of the various Athenian confederacies. After the decline of Athens, Rhodes became the chief maritime power of the Aegean. In 228 B. C., we find her heading all the states interested in the Pontic trade in a war against Byzantium, which had got astride of the Bosphorus by the acquisition of territory on the Asiatic side, and was levying a toll on all goods brought from the Pontus.¹⁴⁷ As Rhodes and her island confederates assisted Athens and Byzantium against the expanding power of Philip of Macedon, in 340 B. C., in his effort to control the straits, so in 201 B. C. the Rhodian League joined the King of Pergamos and the Romans to prevent Philip V. from attaining a like purpose.¹⁴⁸

WHEAT PRODUCTION IN WESTERN MEDITERRANEAN LANDS.—In the lands of the Western Mediterranean, geographic conditions were more favorable to wheat culture than in the Eastern Basin, apart from the Pontic and Egyptian fields, which lay outside the Mediterranean climatic region. The rainfall was in general greater, more reliable, and lasted longer. Hence the farmers' crops were less jeopardized by failure of the autumn and spring rains. Tertiary and Quaternary plains, though no larger, were more evenly distributed. In Sicily and parts of Italy disintegrated lava, tufa, and volcanic ash lent

¹⁴⁶ Theophrastus, *Historia Plantarum*, Bk. VIII, ch. IV, 5.

¹⁴⁷ Polybius, IV, 39, 46, 47, 50.

¹⁴⁸ Mommsen, *History of Rome*, vol. II, p. 411. 1905.

exuberance to the fertility of the soil, and enabled it to retain the moisture necessary for the maturity of the crop during the dry period before the harvest. Sicily was an important granary from very ancient times, and produced wheat that almost equalled the Boeotian grain in nutritive quality. Theophrastus attributed the heavy crops to the frequent spring showers of Sicily.¹⁴⁹ Strabo states that its wheat, honey and saffron surpassed that of Italy.¹⁵⁰ Its grain exports went to Greece certainly at the beginning of the 5th century B. C., and probably earlier. During the time of Agathocles of Syracuse, about 310 B. C., Carthage imported wheat and other provisions from Sicily and Sardinia, securing this traffic by her control of the sea. Agathocles, at war with his Punic neighbor, planned to break up this grain trade and equipped a fleet for the purpose.¹⁵¹

EARLY ROMAN GRAIN TRADE.—Rome imported Sicilian wheat from the beginning of the Republic. Ordinarily the fertile plains of the lower Tiber and Anio sufficed for the agricultural communities which constituted the ancient Latin League and the early Roman state; but during periods of drought which destroyed the harvests, or of sustained war, which interrupted tillage and devastated the growing crops, importations of wheat and spelt were necessary. Frequently these came from the fertile volcanic region about the Bay of Naples. The moist black earth of Capua and the famous Phlegraean fields about Cumae were considered standard wheat lands by the ancients,¹⁵² and their choice product could be readily transported by sea along the coast to the Tiber mouth. Rome's nearer neighbors, the Hernici of the broad and fertile Trerus River valley, and the Volscii of the upper Liris valley and the Latium coastal plain, possessed good wheat land, and at times they seem to have sold grain to Rome; but they were victims of Roman wars of expansion and therefore generally refused to sell to their ambitious neighbor in her hour of need.¹⁵³ Rome therefore often drew upon the abundant grain resources of Etruria, whence wheat could be transported either down the Tiber or along the coast. Etruria is an old volcanic region of rich heavy soil. Its streams drain hills overlaid with trachyte, tufa and basalt, and deposit in the valley plains soil rich in potash, soda and phosphoric acid,—all important articles of plant food.¹⁵⁴ Pliny considered the wheat of Clusium, grown in the lake-strewn basin of the upper Clanis River (Chiana), the best

¹⁴⁹ Theophrastus, *Historia Plantarum*, Bk. VIII, ch. IV, 4; ch. VI, 6.

¹⁵⁰ Strabo, Bk. VI, ch. II, 7.

¹⁵¹ Diodorus, *Siculus*, XXI, fragment 12.

¹⁵² Vergil, *Georgic* II, 217-224. Columella, II, 9. Strabo, Bk. V, ch. IV, 3, 4, 8.

¹⁵³ Livy, II, 34.

¹⁵⁴ W. Deecke, *Italy*, pp. 64, 96, 376. New York, 1904.

in the world. It weighed twenty-five per cent more than Boeotian wheat.¹⁵⁵

In the early interstate grain trade of Italy, Rome figures as a frequent importer. During a protracted period of famine in 490 and 489 B. C., it purchased grain all along the Etruscan and Campanian coasts and in Sicily. Etruscan grain was also brought down the Tiber, probably from the rich Clusium fields.¹⁵⁶ In 474 B. C., during a scarcity due to a prolonged war with Veii, Rome imported wheat from Campania;¹⁵⁷ in 437 B. C., when evidently a general drought had reduced the harvests, she "sent out embassies by land and sea to all the neighboring states to purchase grain, with little result except that a small quantity was procured in Etruria."¹⁵⁸ In 409 and 408 B. C. Rome was forced by famine and pestilence to import grain from Etruria, the upper Tiber cities and Greek Sicily. She could get none from Campania because the fertile district of Capua and Cumae had just been conquered by the mountain Samnites, who refused to aid their rival neighbor.¹⁵⁹ Etruria continued to be the chief Italian source of supply¹⁶⁰ until Rome established her naval power sufficiently to ensure importations of overseas wheat. The importance of this nearby reliable supply of Etruscan wheat may be inferred from the fact that in 210 B. C., when the grain fields of Campania were in Hannibal's hands, and those of Sicily had been devastated by five years of continual war, Rome's granaries were so depleted that a medimnus of Sicilian wheat sold in Rome for the high price of 15 denarii, or \$2.56.¹⁶¹ At this juncture Rome renewed an old alliance with Egypt, and secured the support of its grain ships to feed Italy and the legions.¹⁶² On the restoration of peace in Sicily, she made extraordinary efforts to revive agriculture in the island for the sake of the wheat.

TERRITORIAL EXPANSION AND THE ROMAN GRAIN TRADE.—This second Punic War, which gave Rome command of the sea, demonstrated to the government the possibility of maintaining Italy and her army by wheat from Sicily and Egypt. Then followed a disastrous competition between the small Italian farms and the vast slave estates in the rich wheat lands of Sicily, Sardinia, Numidia, Carthaginian Africa, and the Guadalquivir valley of Spain.¹⁶³ Field agriculture in

¹⁵⁵ Pliny, *Historia Naturalis*, XVIII, 7.

¹⁵⁶ Livy, II, 34.

¹⁵⁷ Livy, II, 52.

¹⁵⁸ Livy, IV, 12, 13.

¹⁵⁹ Livy, IV, 52.

¹⁶⁰ Livy, XXVIII, 45.

¹⁶¹ Polybius, IX, 44.

¹⁶² Mommsen, *History of Rome*, vol. II, p. 315. 1905.

¹⁶³ Strabo, Bk. III, ch. II, 6; Bk. V, ch. II, 7. Pliny, *Historia Naturalis*, XVIII. 10.

Italy declined as the country was flooded with foreign grain. Sea transportation of wheat from Sicily and Sardinia was as cheap as land transportation from Etruria and Campania. The extensive alluvial plain of the Po valley, especially Gallia Transpadana, yielded fine wheat in large quantities,¹⁶⁴ but it was too far from the capital to compete with Sicilian and Sardinian grain. Hence in 150 B. C. wheat sold there for four oboli or twelve cents the medimnus, and barley for two oboli or six cents,¹⁶⁵ owing to lack of a market. The farmers found it more profitable to feed their grain to hogs, fattening the mast-fed pigs till they rivalled modern Berkshires and exporting the hams and bacon to Rome.¹⁶⁶ Meanwhile Sicilian and Sardinian wheat sometimes sold in Rome for the freight charge.¹⁶⁷ The conquest of Spain, especially the fertile Guadalquivir valley, in the Second Punic War placed the Iberian grain at the disposal of Rome. Even in 203 B. C. the government drew wheat both from Spain and Sicily to supply Scipio's army in Africa, while that army, immediately after landing on Carthaginian soil, gathered in the grain from the broad and productive fields of the Bagradas River valley.¹⁶⁸ At the close of the war Rome was selling its citizens Spanish and African wheat at 12 to 24 asses (20 to 40 cents) a medimnus.¹⁶⁹ It procured the grain by tribute and purchase. The Roman army fighting in Macedonia in 170 B. C. was supplied by Carthage with 250,000 bushels of wheat and 125,000 bushels of barley. Numidia sent it an equal amount of wheat which the Roman government bought.¹⁷⁰

After the annexation of Carthaginian and Numidian Africa and the conquest of Egypt, both the tribute and purchase grain increased in amount, in proportion to the productive area and fertility of these countries. In the time of Augustus, Egypt furnished one-third of the grain consumed by Rome, Africa another third, while Sicily, Sardinia, Spanish Baetica, and Italy's own reduced yield supplied the final third. The grain of Egypt and Africa was so vital to Italy and the Imperial City that these countries became the key to the control of Rome itself. Conquest of either one was equivalent to the conquest of Italy, a fact that was not lost upon the later adventurous aspirants to the throne of the Caesars.¹⁷¹

The immense area of the Roman Empire, which finally included all the Mediterranean wheat lands, was the politico-geographical factor

¹⁶⁴ Pliny, *Historia Naturalis*, XVIII, 7.

¹⁶⁵ Polybius, II, 165.

¹⁶⁶ Strabo, Bk. V, ch. I, 12.

¹⁶⁷ Livy, XXX, 38.

¹⁶⁸ Livy, XXX, 3.

¹⁶⁹ Mommsen, *History of Rome*, vol. III, p. 76. 1905.

¹⁷⁰ Livy, XLIII, 6; XLV, 13.

¹⁷¹ Mommsen, *Provinces of the Roman Empire*, vol. II, pp. 260, 366-7. 1887.

which stimulated grain importations into Italy and discouraged native agriculture. Italy's focal location in the Mediterranean Sea was a second geographic factor operating to the same end. It facilitated maritime movements of grain from all the big areas of production and on a scale impossible in a land empire in ancient times. Italy's location was comparable to that of the Attic peninsula in the Eastern Basin, and was conducive to similar economic effects. The maintenance of these systematic importations depended upon the security of the sea-ways between the wheat countries and the Roman markets, and therefore upon the efficiency of the navy. The decline of Roman sea power from 102 to 67 B. C. fatally weakened the marine police. Pirates so infested the grain tracks that between 75 and 67 B. C. imports ceased, and the price of wheat at Rome soared to 120 sestertii or \$4.65 the medimnus, or about ten times the market price in Sicily.¹⁷² Therefore when Pompey was appointed dictator of the sea in 67 B. C., his first act was to clear the waters about Sicily, Sardinia and Africa, in order to restore the movement of wheat from those provinces to Italy; his next was to suppress the Cilician pirates, who issued from their convenient lairs along the Taurus Mountain littoral and infested the wheat route from Egypt passing their doors.¹⁷³

Imperial Rome and Athens owing to quite different causes were both singularly dependent upon overseas grain lands. The vulnerable spot of Athens' sea empire lay in the Hellespont; that of Rome's land empire lay in Africa and Egypt. While Athens was constantly fighting rival Greek commonwealths, whom she was powerless to conquer because of her small land base and the nature-made individualism of the Greek states, Rome eliminated her foreign enemies by the *pax Romana*, but left sea pirates who captured her grain ships, and political pirates who seized the imperial throne by possessing themselves of her chief grain lands. There was perhaps never a time that ancient Italy could not have fed itself from its home fields, except in the rare years of drought. There was never a time that Athens could have fed itself, unless it established a maritime power supported by some measure of political power, as evinced in the various Athenian confederacies. Rome's expansion aimed always at more territory; an imperial parasite, she lived off of the newly acquired lands as Athens never lived off of Euboea or Thrace or Crimea. Therefore Rome's grain lands became a bludgeon in the hands of candidates for the imperial throne.

¹⁷² Cicero, Verres, 92, 214.

¹⁷³ E. C. Semple, *The Pirate Coasts of the Mediterranean*, Geog. Rev., vol. II, pp. 134-151. New York, 1916.

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THE REGIONAL GEOGRAPHY OF TURKEY: A REVIEW OF BANSE'S WORK *

By ELLEN CHURCHILL SEMPLE

[With separate map, Pl. VI, facing page 350]

Turkey lies at the junction of three continents. It is thrust in between the Mediterranean and the Persian Gulf, between the Black Sea and the Red. It bridges the space between the Balkan Peninsula and Persia, between Persia and Egypt. It is a great isthmian region, dominating the chief intercontinental trade routes of the eastern hemisphere. It flanks for a thousand miles the steamer highway of the Suez Canal and Red Sea. It controls the Dardanelles and the Bosphorus leading to the Black Sea lands. It is crossed by old caravan tracks and the future railroad routes connecting the Mediterranean and Black Sea ports with the Persian Gulf coast. It therefore holds a highly strategic position.

By reason of its location, Turkey has drawn the elements of its population from the grasslands of Semitic Arabia, from the highlands of Aryan Persia, from the Caspian plains of Mongolian Asia, from the multifarious race stocks of the Russian Caucasus, from the Greek coasts of the Balkan Peninsula and Aegean Isles. These it has assimilated more or less to the indigenous Hittite or Alarodian race. The peoples comprised within the borders of Turkey differ in racial and geographic origin, in language and religion, in social and economic development. On the other hand they are united by certain common bonds found in the semiarid climate of Turkey, the prevailing steppe vegetation with its concomitant, pastoral-nomadic life, the patchy distribution of the arable land, the sparsity of the population, and finally the deep underlying community of ideals molded by this environment through a process of social development unfolded from within through the ages. To these may be added the religion of Islam and the fanatical devotion of its adherents, who here number five-sixths of the people.

Anatolia, or Asia Minor

The Anatolian Peninsula stretches like a bridge between southwestern Asia and southeastern Europe. It consists of a high plateau, increasing in altitude towards the east, and rimmed on its three seaward sides by young mountains rising boldly from the coast. Structurally and racially it is part of Asia. Its wide steppe interior has been a passway for Asiatic migrations,

* Ewald Banse: *Die Türkei: Eine Moderne Geographie*. 3rd edit. 454 pp.; map, ills., bibliogr., index. Georg Westermann, Brunswick, 1919. 10 x 6½ inches.

The spelling of place names in this article is for the most part in accord with the Royal Geographical Society's system. On the general question see the note on the Permanent Committee on Geographical Names in the record section of this number of the *Review*.—EDIT. NOTE.

but the massive mountain barriers which trace the northern and southern coasts have excluded oversea immigrants from Europe and thus maintained the Asiatic solidarity of the peninsula. Only the Aegean front, with its deeply embayed coast and its structural valleys opening westward, has been hospitable to Hellenic colonization and European influences.

The rain-bearing winds from the neighboring seas expend their moisture on the outer slopes of the coast ranges (rainfall 600 to 1,000 mm.) and reach the interior impoverished. Hence the plateau core has an arid climate, extensive steppes or saline wastes where nomads pasture their herds, mountains bare or thinly covered by a scrubby growth of trees on the high inland slopes, and shallow U-shaped valleys drained by meager streams which serve to irrigate strips of tillage land along the interior piedmont. The coast ranges get ample precipitation for winter grain crops along their lower slopes, where the typical Mediterranean vegetation prevails, and they have abundant water to irrigate in summer the orchards and gardens of the deltaic plains or valley lowlands at their base. On their upper slopes they support a magnificent belt of forests, which averages 60 miles in breadth and comprises one-third of Anatolia's area.

THE MARMARA COAST LANDS

The Marmara region comprises the indented coast lands encircling the Sea of Marmara and the Straits—namely, eastern Thrace, the Troad, Lesser Phrygia, and Bithynia. It belongs both to the Mediterranean and Pontic climatic provinces and combines the vegetation appropriate to each. Thrace is a Quaternary plain, screened on the north by low mountains which partly fend off the moist winds from the Black Sea and give Thrace a steppe vegetation more suggestive of Asia than of Europe. Cultivated fields and orchards are distributed along its valley floors, especially in the moist lowland of the Maritsa River. The Asiatic half of the Marmara region, owing to the disposition of the mountain ranges in successive tiers well back from the Pontic shore, is accessible to the Black Sea winds and gets ample rain (800 mm.) over most of its area. Agricultural products in great variety—grains, olive oil, wines, linseed, flax, cotton, opium, sesame, and mulberry trees for sericulture—are raised along the seaward slopes, while the valleys in the rain shadow are either cultivated by irrigation or afford pasturage for cattle. Oak and fir forests on the high ranges attest the influence of the Pontic winds.

Constantinople, intercontinental capital, holds the head of the Anatolian bridge and controls the marine highway of the Bosphorus.

NORTHERN ANATOLIA

Pontic Anatolia comprises the northern mountain zone of the peninsula. Its relief consists of steep-sided horsts, dissected into mountain chains, which rise directly from the coast and increase in elevation from west to

east. The rugged littoral has few ports and difficult hinterland connections. The region is distinguished by its Pontic climate, characterized by ample precipitation all year round on the seaward slopes, though west of Samsun the rainfall shows a marked summer minimum. Eastward precipitation increases from 727 millimeters at Samsun to 875 millimeters at Trebizond and 2,500 millimeters at Batum. Behind the mountains it declines rapidly to 400 millimeters on the margin of the interior plateau. Dense forests of conifers and deciduous trees on the rainy seaward slopes support a big lumber industry. Sawmills on the perennial torrents convert the logs into planks, which are exported through Samsun, Sinope, and Trebizond to Mediterranean markets. The subregion of Paphlagonia and the adjacent district of Djanik in eastern Pontus are distinguished by longitudinal valleys near the coast, which contain long bands of settlements and farms, and carry the only roads parallel to the littoral in all this region. Djanik has the only fairly good ports (including Samsun) and the only fertile deltaic plains. Lazistan, a narrow zone of lofty forested mountains stamped with isolation, is crossed by the caravan route from Persia and Armenia to Trebizond, *entrepôt* for a large plateau hinterland.

THE PLATEAU INTERIOR

The central region is characterized above all by its dry plateau character. The rain falls chiefly in spring, when it provides temporary pasturage for the Turcoman and Kurdish nomads. The zone of settlements, dependent upon irrigation streams, is fairly broad in northern Cappadocia and Galatia, where the old folded ranges derive some rain (350 mm.) from the Pontic winds; but it is narrow in the south, where the Taurus rampart excludes the Levantine winds. The desert core of the plateau nearly coincides with the province of Lycaonia, which gets only 200 millimeters of rain annually. In the Konia plain, however, German enterprise in 1912 reclaimed 100,000 acres of land by irrigation works which tapped the Isaurian lakes in the Taurus Mountains. In eastern Cappadocia the great volcanic mass of Mt. Erdjias (13,317 feet) forms a climatic island with a local precipitation of 800 millimeters, chiefly in the form of snow which lingers on the summit late in summer. Its streams irrigate a belt of fields and gardens planted in the tufaceous soil about its base and maintain numerous villages and towns, chief of which is Kaisariya. Phrygia, the western province, is a highland of good pastures and arable valleys because it is fairly accessible to the Aegean winds which here penetrate through gaps into the interior and bring 400 to 500 millimeters of rain.

WESTERN ANATOLIA

This region embraces the Aegean front of Asia Minor. Its highly articulated coast and its valleys of subsidence extending from the Aegean embayments into the interior have made it hospitable equally to the moist sea

winds and to oversea peoples. The relief is extremely varied. Old folded mountains in the north and south and the Lydian crystalline mass in the middle have all been modified by elevations and subsidences, overlaid in the north and middle by Tertiary deposits and volcanic outflows, and subjected to various degrees of erosion according to the rainfall. The climate is typically Mediterranean, with a summer drought lasting three months in the north and six months in the south. The rainfall, which is 653 millimeters at Smyrna, declines gradually from the coast inland; it is 500 millimeters sixty miles from the sea.

Mysia, exposed to the Pontic rains, has a very dissected relief, which has proved an obstacle to communication and cultural development. The rains nourish large forests of pine, oak, and beech, extending from the coast far into the interior. The late Tertiary deposits provide in general fertile soils; but, owing to difficult communication, the agricultural districts are small and scattered, except in the plain of Pergamum, where the Caicus valley opens a highway from the coast. There the alluvium produces various crops, while the bordering slopes are planted in orchards and vineyards. Lydia, with its ample Tertiary deposits, fertile volcanic soils, and adequate rains, is the land of tillage. Its abundant harbors and long subsidence valleys make it also a land of traffic routes between coast and interior and explain the big export trade of Smyrna. Caria has an infertile soil which neutralizes the advantages of its embayed coast. Only the Meander valley forms a belt of alluvium which flanks the crystalline mountains to the south and produces grains, hemp, cotton, and tobacco. Where the alluvium meets the crystalline rim of the valley are the famous "Smyrna fig" plantations.

SOUTHERN ANATOLIA

This region is traversed by the folded ranges of the Taurus system which extends in a shallow crescent from the Anti-Taurus to central Phrygia. The mountains intercept the rain-bearing winds from the Levantine Sea and therefore have abundant forests on their seaward slopes; but the inner flanks support only pasturage and irrigated patches of tillage land. The climate is typically Mediterranean along the coast; the five months of summer drought is broken only by occasional cloud-bursts. In Lycia the mountains rise directly from the sea. The rugged coast is broken at intervals by little deltaic flats at the heads of protected bays, where population concentrates and cultivates plantations of subtropical fruits. Pamphylia embraces the narrow coastal plain at the head of the Gulf of Adalia. Its villages and farms are distributed along the inner piedmont border, which combines good drainage, fertile soil, and ample irrigation streams for the cultivation of cotton, sugar cane, and various southern fruit plantations. Near the sea a broad zone of swamps and lagoons repels settlement but attracts the Yuruk nomads who pasture their herds in the marsh meadows. The hinterland, Pisidia, is a densely forested mountain region cut by long,

gorgelike valleys which admit the rain-bearing winds far into the interior and open above into the high lake region of Isauria.

CILICIA

This region comprises the big subsidence plain at the head of the Gulf of Mersina, together with the vast semicircular rampart of mountains which enclose both plain and gulf. Located at the inner angle of the Levantine Sea, Cilicia forms a transit land between Anatolia and Syria. It shares in the history and culture of both countries, despite the multiple ranges which enclose it on three sides. These folded ranges, lofty and well forested on their seaward slopes, rise to plateau-like summits in the interior, where reduced rainfall and steppe vegetation restrict tillage but encourage pastoral nomadism. The northern half of the Cilician lowland has been reduced to a peneplain, only 250 feet above the sea, by the erosive action of the streams of the Anti-Taurus. The surface shows a thin sheet of humus overlying a coarse conglomerate. The climate is hot and semiarid, while the deeply incised streams are not available for irrigation. Nomad stock raising prevails here. In contrast, the southern half consists of a fertile alluvial plain built up in a shallow bay and abundantly supplied with typical deltaic streams available for irrigation. It is planted with a great variety of subtropical crops and its well drained portions are sprinkled with towns and villages. The low swampy coast is still unoccupied. The Cilician plain, which was a famous district of production in early Greek and Roman times, has recently been recolonized by Egyptian, Syrian, Cretan, Bulgarian, and Circassian peasants, who have brought 1,000 to 1,200 square miles of its fertile soil under cultivation and dislodged the old Turkish population. The northern or piedmont zone is also in large part arable, but its development must wait for railroads and colonists.

Armenia

Armenia is a high plateau (5,200 to 6,000 feet) located behind the lofty Lazistan ranges and almost barred alike from the rains and the cultural influences emanating from the Black Sea. It is bordered on the south by the Armenian Taurus, which greatly impedes communication with the Mesopotamian plains. It is crossed, east and west, by folds of the Anti-Taurus and Zagros Mountains, which have been disturbed by recent volcanic upheavals and overlaid by vast lava flows, so that the relief of the country is extremely complex. Its valleys are blocked on the east by lofty ranges, whose passes are snow-bound eight months in the year, and they open westward upon high and arid plateaus which form an inhospitable transit land to Anatolia. Armenia is a natural stronghold, giving its possessor a grip upon the surrounding countries. It has always been an object of conquest for neighboring states who wanted it for a border fortress against aggression.

The climate of Armenia is distinguished by the severe snowy winters, which, owing to the altitude, last for six to eight months. Precipitation is confined to winter and spring, except in the extreme north, where the Pontic winds bring occasional summer showers to the plain of Erzerum (6,200 feet). The annual rainfall is 800 to 600 millimeters in the high eastern portion but sinks westward with declining altitude to 500 millimeters and beyond the Euphrates drops to 350 millimeters. Armenia is pre-eminently a steppe land, because the short summer period warm enough for plant growth is arid both on the mountains and in the valleys. The forests, which are scant and few, are practically confined to the valleys, because the protracted cold and the violent winds of the mountains prevent their growth. Therefore pasture lands are widespread, nomad stock raising prevails, and tillage areas are insignificant except in a few lacustrine expansions of the longitudinal valleys.

THE INTERIOR PLATEAU (INNER ARMENIA)

This plateau region, despite its elevation, is a subsidence area in relation to the high mountains on its northern and southern borders. Offshoots of the Anti-Taurus folds defining its northern boundary rise to 8,000 or 10,000 feet; they offer, however, fairly easy passes by which the thinly strung villages of the valley of the Frat Su (northern branch of the Euphrates), especially the cities of Erzingan and Erzerum, maintain connection with the plateau towns of eastern Pontus and Russian Armenia and through these with the Black Sea ports.

South of the Frat Su runs the great divide of Armenia which separates this longitudinal valley from the Murad Su. It is a lofty folded system, overlaid in the south and east by volcanic deposits which everywhere level up the inequalities to wide plateau surfaces. Its steep northern front marks the southern limit of the Pontic winds and the northern limit of the Kurds. Its long southern slope is semiarid, covered with sparse summer pastures and affording small lacustrine basins utilized for agriculture. It comprises Dersim, an isolated mountain country north of Kharput, which maintained its independence till 1908; the high level plateau of Bingöl Dag, inhabited by pastoral Kurds and Armenian villagers, the latter forming one-third of the total population; the Lake Van province, cradle of the Armenian folk, who in this province alone form a majority of the population; and finally the upper Murad province, through which runs the old caravan track from Tabriz to Erzerum, traversing a lacustrine trough along the base of the Aghri Dag frontier range.

West of the Euphrates the mountain structure of Armenia extends with diminished relief into an undulating plateau which rises westward to the Cappadocian frontier. Its steppes are grazed by the cattle, sheep, and goats of Kurdish and Turcoman nomads. Its few villages are occupied by Turks and sedentary Turcomans.

SOUTHERN ARMENIA

This region comprises the broad belt of folded mountains, formed by the Armenian Taurus and Zagros systems, which separate Inner Armenia from the Mesopotamian depression. This barrier, readily crossed at few points, marks the limit of Semitic expansion from the southern plains; but the peoples of the plateau interior, both Kurds and Armenians, have easily descended through the passes to the fertile Mesopotamian piedmont and there exploited its pastoral and agricultural possibilities.

The Commagene province west of the Euphrates consists of a high plateau core flanked north and south by narrow mountain folds. Its rivers flow through deeply cut transverse valleys to the Euphrates. Steppe vegetation appears after the scant spring rains. Tillage is practically confined to the valleys and base of the mountains, where the Malatia and Marash valleys are centers of dense population and varied agriculture.

The Armenian Taurus, rising steeply from the Murad Su, sends most of its drainage southward. Owing to scant rainfall the slopes are bare or dotted with clumps of dwarf oak. At the southern openings of the narrow valleys are intermittent groups of settlements with small terraced and irrigated fields. Near the lower Murad Su, just above its confluence with the Euphrates, is a productive agricultural plain which supports Kharput and Mesere. South of Lake Van the Taurus meets the yet higher and broader Zagros folds. Thin oak forests dot the slopes up to 6,000 feet. This is a wild, almost impenetrable country inhabited by independent Kurdish tribes who combine a little terrace agriculture with extensive nomadic stock raising.

Mesopotamia

Mesopotamia is a large subsidence basin, surrounded by the Armenian Taurus on the north, the Zagros on the east, and the Syro-Arabian plateau on the west. It slopes from the Tauric piedmont at 3,000 feet down to the Persian Gulf; two-thirds of its area lies below the 1,000-foot contour line. The deltaic lowland of Babylonia, extending from the sea to the inner edge of the alluvium at 300 feet elevation, presents a sharp contrast to upland Mesopotamia, which rests upon a rock foundation. Upland Mesopotamia falls into three natural regions, distinguished from each other by geological structure, relief, and rainfall.

The annual precipitation, which is confined to winter, is meager. Below the 1,000-foot contour it nowhere exceeds 250 millimeters, but it increases to 390 millimeters at Urfa at 1,600 feet and to 490 millimeters at Diarbekr in the Tauric piedmont at 2,035 feet. In the northern piedmont districts rains fall during several months and suffice for winter crops of grain, but drought destroys the harvest every four or five years. Elsewhere irrigation is imperative for all tillage.

NORTHERN MESOPOTAMIA

This region embraces the northern upland and piedmont; it is defined on the south by a line connecting Mosul on the Tigris with Membidj on the Euphrates, which may be taken as the boundary of the well-watered area. The region comprises several subregions. The Upper Tigris district, a Miocene plateau overlaid with basaltic lava, stretches from the foothills of the Taurus on the north to the volcanic mass of the Karadja Dag on the southwest and the bold scarp of the limestone plateau of Tur Abdin on the south. It has a moderate rainfall (500 to 600 mm.), which is protracted into April, and abundant streams which irrigate fields of rice and cotton, besides extensive orchards, vineyards, and gardens. Agricultural villages are scattered fairly evenly over the district. Cities like Diarbekr and Sert owe their prosperity to their location on important traffic routes, rather than to local production. The Karadja Dag massif (6,068 feet) and the Tur Abdin plateau (3,300 feet) offer little inducement to tillage, but their reservoirs of winter snow feed the abundant springs and streams which flow southward to form the Khabur River and which irrigate a belt of gardens, orchards, vineyards, and fields stretching along the alluvial piedmont plain. Farther west a limestone subregion of block mountains, 2,400 or 2,700 feet in altitude, gives rise to the Balikh River, whose troughlike valleys support a varied agriculture and a dense population.

Beyond the southward reach of these streams steppe vegetation and Arab nomads hold sway. To the southeast, however, the long, detached range of the Sindjar Mountains rises high enough (4,600 feet is the culminating height) to extract some moisture from the clouds and to support irrigated oases along its base and good pastures on its slopes. This climatic island is the asylum of the semipagan Yezidis.

The population of Northern Mesopotamia consists of Kurds, mingled with intrusive Armenians along the highland border of the region and with sedentary or nomadic Arabs along the southern margin.

CENTRAL MESOPOTAMIA, OR EL DJESIREH

This region lies between the northern piedmont and the Babylonian lowland and is distinguished from both of them by its pronounced steppe character and its meager area fit for tillage. Cultivation is restricted to small patches scattered along the valley floor of the Euphrates and its two tributaries, the Khabur and Balikh. The whole region is a flat, arid plain whose vegetation, green only in spring, becomes sparser and shorter-lived from north to south. Shammar Arabs pasture their herds of sheep, camels and horses over the steppe and market their wool products in the border towns of Aleppo, Baghdad, and Mosul.

EASTERN MESOPOTAMIA

Eastern Mesopotamia embraces the terraced foreland of the Zagros, crossed by spurs and seamed by snow-fed rivers from the ranges behind.

Tillage land and irrigation streams lie side by side, but their economic development is jeopardized by the raids of mountain Kurds and Arab nomads. The northern province, Assyria, gets enough rain for winter grain crops but applies irrigation to its orchards and gardens. Farms and villages are densely distributed over the triangle between the Tigris and the southern watershed of the Great Zab. This province is the focus of roads leading in all directions—a fact which explains the prosperity of ancient Nineveh and modern Mosul.

The southern foreland, extending from the Great Zab basin to the Diala, is distinguished from the northern province by its greater breadth, its warmer and far drier climate, its predominant steppe area, the necessity of irrigation for all tillage, and the equal division of the country between Kurds in the eastern part and Arabs in the western. Settlements and farms stretch in a narrow belt between two chains of foot hills. Abundant petroleum wells promise wealth in the future.

SOUTHERN MESOPOTAMIA, OR BABYLONIA

This region occupies the broad alluvial depression between the foothills of the southern Zagros and the escarpment of the northern Arabian plateau. The soil consists of gravel and sand overlaid with clay, marl, and mud. The level surface and the shallow beds of the rivers which offer conditions for irrigation also permit widespread inundations. About two-thirds of the whole area is under water in the flood season from March to August; an equal amount is dry from October to February.

Northern Babylonia occupies the head of the deltaic lowland. This location, relatively high, insures good town sites and fair drainage while it admits few permanent swamps. The largest tillage district lies between the Tigris and Diala and is watered by canals from the mountain stream. It raises grains, fruits, tobacco, cotton, sesame, rice, and dates. Baghdad, located at the focus of various caravan routes and at the head of steamer navigation on the Tigris, relies both on its trade and its local production. Western Babylonia, divided between swamps and tillage land, has many small villages and several towns along the arms and canals of the Euphrates. In lower Babylonia, a region of widespread swamp, steppe, and saline desert, agriculture is negligible, except in the Shatt-el-Arab district, which forms a band of palm oases along the river and produces the finest dates in the world. These are exported in vast quantities through Basra, the river seaport on the Shatt.

Northeastern and Northern Arabia

The Turkish border region of eastern Arabia forms a transition zone between the plateau interior and the Persian Gulf-Mesopotamian depression. It is an arid steppe inhabited by independent Bedouin tribes, over whom the Porte exercised a shadowy authority definitely overthrown by Ibn Saud of

the southern Nedjd in 1913. The low coast land of El Hasa is supplied with abundant ground water, which drains down from the interior and in many places is reached by shallow wells. Date culture and pearl fisheries form the chief occupation of the people. Persian influences, both ethnic and religious, have permeated the region from the opposite coast.

Syria

Syria comprises the belt of fairly well-watered highlands, located between the Mediterranean and arid Arabia. The grain of the highlands runs north and south and shows four parallel bands of relief and climate: (1) a belt of block mountains or plateaus along the coast, with moderate or ample rainfall according to altitude and location; (2) a long middle rift valley with meager rainfall; (3) an inner highland accessible on its western slope to the rain-bearing winds; (4) a semiarid plateau hinterland. These successive belts of relief and climate appear in the four maritime geographical regions of Syria, which are therefore fundamentally similar, though differentiated in various minor features. The corrugated relief would make Syria a long-drawn barrier were it not for several transverse subsidence troughs which open passways from the coast to the interior. The rainfall, though variable in amount, is everywhere confined to winter. The summer drought is long.

NORTHERN SYRIA

This region is characterized by a relatively low relief wherein the feature of twin highlands and rift valley is scarcely apparent. The surface is an undulating plateau, adapted to agriculture in the north, owing to the Orontes break in the coast range which admits the rains from the Mediterranean into the interior and gives Aintab an annual precipitation of 560 millimeters. The southern portion has irrigated tillage strips along the streams flowing down from the Kurd Dagh, with grazing land in the interfluvial spaces. Low relief and ready access to the coast make this region a natural transit land between the Mediterranean and the Euphrates.

STEPPE SYRIA

The coast range of Steppe Syria is a dissected horst, rising from the coast in natural terraces which afford excellent conditions for agriculture and sinking steeply to the rift on the east. This valley, drained by the Orontes River, spreads out into cultivated plains about Homs and Hama but narrows sharply towards the north. The eastern mountain range is here supplanted by a dissected plateau too low to cause rain. Therefore tillage is confined to the western part of the region, and the steppe hinterland is correspondingly expanded.

CENTRAL SYRIA

Central Syria consists of the Lebanon Mountains and their hinterland. The region is distinguished by the possession of several mediocre ports; by

the high altitude of both the eastern and western block mountains; by the considerable elevation of the rift valley, which is 3,600 feet at its highest point; and by a rainfall which is heavy on the Mediterranean slope of the Lebanon, considerable in the rift valley and on the western side of the Anti-Lebanon and Hermon, but which suddenly ceases in the rain shadow of this high eastern barrier. Hence tillage, which flourishes to the westward, stops short east of the Anti-Lebanon and Hermon, except where the drainage streams from these create the Damascus oasis in the interior. The coastal belt produces various subtropical fruits, tobacco, cotton, and mulberry trees for sericulture. The Lebanon trough raises grain, mulberry, and olive trees, while gardens, vineyards, and orchards dot the western slope of Mt. Hermon and Anti-Lebanon up to 5,200 feet.

PALESTINE, OR SOUTHERN SYRIA

This region is distinguished from the preceding by the presence of a narrow coastal plain, which is totally lacking in safe harbors; by the lower elevation and plateau form of its eastern and western highlands; and especially by the depression of the rift valley below sea level. Lower elevation, combined with a southern location and proximity to the Arabian Desert, makes Palestine the driest region of Syria.

The western highlands get from 500 to 650 millimeters of rain, which suffices for various winter crops, for olives, and for vineyards. The maritime plain, with only 200 to 400 millimeters of rain, depends upon irrigation; it finds the necessary water in the abundant springs which burst forth at the base of the Judean limestone plateau and in the high ground-water table in the plains of Sharon and Philistia, which is reached by shallow wells. The Jordan valley has a meager rainfall from 400 millimeters in the north to 200 millimeters in the south. The waters of the Jordan itself flow in too deep-sunk a bed to be generally available for irrigation, but patches of land on the old Jordan Lake strands are irrigated from springs and wadis. The eastern highland, with a moderate rainfall (400–600 mm.) only in the northern or Golan district, combines limited tillage with stock raising, sedentary with nomad life, in the Ammon and Moab districts.

HAURAN

Hauran is an inland plateau region located between Mt. Hermon and the elongated volcanic mass of Mt. Hauran (5,200 feet), whose streams irrigate a broad belt of fertile country at their base, converting an arid district into the granary and garden of Syria. The Damascene, or Damascus district, occupies a terrace at the eastern base of Anti-Lebanon covered with alluvial deposits and watered by canals from the Barada and Awaj Rivers. It supports eighty villages, with their orchards and gardens, several towns, and the city of Damascus—a border market of the Syrian Desert and focus of

many roads. Southward from Damascus extends the fertile lava plateau of Nukra, or Bashan, watered by ample streams and producing excellent crops of wheat and tobacco on the rich volcanic soil which covers the underlying limestone.

Western Arabia

Syria links Anatolia with the Holy Land of Islam. Western Arabia comprises a belt of territory about 140 miles wide, extending for 1,300 miles along the Red Sea coast, the terraced escarpment, and high rim of the Arabian Plateau. Its profile is everywhere the same—coral reefs and coral strand at the foot of white cliffs; then a strip of desert plain with an occasional group of palms growing at a wadi mouth; beyond this, walls of rock rising in terraces to the plateau rim, 6,000 feet high or more and loftier in the south than in the north. Despite this nearly identical relief, Western Arabia forms two distinct geographical regions, sharply differentiated by their rainfall.

The northern, or subtropical region, includes Midia, Hedjaz, and Asir. Its rainfall, which is confined to winter, is very variable and probably less than 200 millimeters a year. The region is steppe or semidesert given over to pastoral nomadism supplemented by a little irrigation tillage in the scattered oases. The Hedjaz, with its sacred cities of Mecca and Medina, imports all the food consumed by its crowds of pilgrims. Asir, the southern province, located on the margin of the tropical rain belt, has numerous and even extensive oases watered by full winter streams. It raises enough wheat, barley, grapes, and various fruits for its own needs, with a slight margin over for export.

Tropical Arabia, or Yemen, Arabia Felix of the ancients, lies in the belt of the summer monsoons and, by reason of its lofty mountains, which, south of the 14th parallel, are 10,000 feet high, receives 600 to 1,000 millimeters of rain. Precipitation decreases northward, however, and at the 18th parallel is only 250 millimeters. The rains last from May to September. Agriculture is the basis of the economic life. The steep slopes have been terraced for gardens and orchards, fields and vineyards, up to 6,000 feet. Barley, rye, almonds, figs, peaches, apricots, apples, pears, bananas, lemons, plums, and walnuts thrive nearly everywhere. The coastal plains and piedmont produce dates, sesame, cotton, and indigo. Higher up grow wheat, tobacco, and especially coffee. The climatic zones of altitude give rise to active domestic exchanges. The export trade, which is inconsiderable, goes out through Hodeida and Aden.

Behind the rain screen of the mountains in both tropical and subtropical Arabia the picture is the same: a bare plateau, watered by rare winter showers, harbors a few villages in its scattered oases, while Bedouins set up their black tents in the widespread steppe desert. The southern Nedjd with its desert stretches broken by groups of oases in the upland belt of the Tuwaik has been described in the preceding article.

CLASSIFICATION OF THE NATURAL REGIONS OF ASIATIC TURKEY (AFTER BANSE)

Asia Minor (Anatolia)

MARMARA PROVINCE

Thrace
The Troad
Lesser Phrygia
Bithynia

NORTHERN ANATOLIA

Paphlagonia
Eastern Pontus

INNER ANATOLIA

Cappadocia
Lycaonia
Galatia
Phrygia

WESTERN ANATOLIA

Mysia
Lydia

SOUTHERN ANATOLIA

Lycia
Pamphylia
Pisidia
Isauria
Highland Cilicia
Cilician Taurus
Lowland Cilicia
Amanus Range
Anti-Taurus

} Cilicia

Armenia

INNER ARMENIA

Middle Euphrates District
Erzerum District (transitional)
Upper Murad District
Lake Van District
Bingöl District
Dersim
Western District (transitional)

SOUTHERN ARMENIA

Commagene Taurus
Armenian Taurus
Zagros Mountains

Mesopotamia

NORTHERN MESOPOTAMIA

Upper Tigris District
Karadja District
Tur Abdin
Khabur Headwaters District
Djebel Sindjar
Northwestern Limestone District

CENTRAL MESOPOTAMIA (EL DJESIREH)

EASTERN MESOPOTAMIA

Assyria
Eastern Scarp District

SOUTHERN MESOPOTAMIA (BABYLONIA)

Northern Babylonia
Western Babylonia
Central and Eastern Babylonia
Delta District

Syria

NORTHERN SYRIA

Aleppo Plains
Kurd Mountains
Kara Su Trough
Northern Gateway

STEPPE SYRIA

Hinterland
Eastern Border Mountains
Orontes Valley
Ansariyeh Mountains
Nahr-el-Kebir Gateway

CENTRAL SYRIA

Phoenicia
Lebanon
El Bikâa
Anti-Lebanon
Hinterland

HAURAN PROVINCE

The Damascene
Eastern Basalt District
The Hauran
The Ledja
Nukra Plain

PALESTINE (SOUTHERN SYRIA)

East Jordan Land
Golan
Gilead
Ammon
Moab
El Ghor
West Jordan Land
Galilee
Samaria
Judea
Coastal Plain

Northeastern and Northern Arabia

EL HASA

NORTHERN ARABIA

Western Arabia

SUBTROPICAL

Wadi el Araba
Arabia Petraea
Midian
Hedjaz
Asir

TROPICAL (YEMEN)





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THE INFLUENCE OF GEOGRAPHIC CONDITIONS UPON ANCIENT MEDITERRANEAN STOCK-RAISING*

ELLEN CHURCHILL SEMPLE

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GEOGRAPHIC DETERRENTS TO PASTORAL NOMADISM.—“It is weather rather than soil that determines the harvest” in Mediterranean lands, said the Greek Theophrastus. It was climate which determined the pasturage there, causing its mediocre quality, its limited quantity and its seasonal distribution through the year. The poor endowment of this region with good grazing revolutionized the economic life of all those pastoral tribes who pushed into the Mediterranean Basin, from the well-watered Danube valley on the north and the vast undulating grasslands on the east. Here Nature offered for their occupancy only limited areas, whose boundaries were drawn by the “unpastured seas,” to use Homer’s expression. Here steep mountain barriers discouraged nomadizing, while the low valleys and narrow coastal plains provided fodder only half the year. Therefore from the arrival of the Israelites and other Semitic hordes in Palestine to that of the shadowy Pelasgians in Greece and Italy, these conditions forced a more or less rapid decrease in the flocks and herds of the pastoral invaders, and hastened the

* Presidential address before the Association of American Geographers, Washington Meeting, Washington, 1921.

advance from nomadism to sedentary agriculture. The Jewish Scriptures, the Iliad and Odyssey, the traditions, customs and religious institutions of primitive Latins, Celts and Iberians, all point to a former preponderance of stock-raising gradually superseded by tillage. Grazing survived, but hardly as an adjunct of tillage. It evolved along lines alien to the rainy lands of the north and to the semi-arid lands to the east. It developed the semi-nomadic summer shift to the highland pastures, familiar in the Swiss Alps and the Scandinavian mountains, but arising from quite different geographic causes, and attended by quite different economic results.

Stock-raising in the ancient Mediterranean world bore the unmistakable impress of its environment. It was conditioned primarily by the summer drought. This destroyed pasturage in the lowlands for two to six months, according to the latitude, and permitted the shallow-rooted herbage to survive only on swampy coastal belts, deltaic flats and mountain-locked lake basins in which the ground-water table was high. Such choice but limited spots furnished the wet meadows or marsh pastures, which the ancients reserved for their brood mares, horses and fine cattle, and which they sometimes guaranteed against failure in exceptionally dry seasons by artificial irrigation. Yet even these grassy areas shrank to mere patches of green as the summer advanced, unless the streams which watered them flowed down from high mountains with lingering hoods of snow.

EFFECT OF RELIEF UPON MEDITERRANEAN PASTURAGE.—The Mediterranean lands made some compensation for the summer drought by their prevailing mountain relief, which provided summer pastures on the heights. The great altitude of the young folded ranges and massive horsts which almost surround the Mediterranean and its Black Sea alcove, their extensive distribution from the Rif Atlas to the densely wooded Caucasus, and their immediate proximity to the vapor-yielding seas, all combined to sprinkle the Mediterranean lands with lofty climatic islands of persistent verdure, wherever the slopes rose high enough to take a toll of moisture from the passing clouds. Here the lowly herbage of the sod flourished the summer through, screened from the sun by the deciduous forests of the upper slopes, nourished by the bed of moist humus about their roots. The summer pastures of the Mediterranean highlands, however, did not offer the variety of grasses and nutritious herbs found in the Alpine meadows farther north; nor did they wear so long the covering of snow which subjects the soil to a slow process of saturation and promotes growth through the ensuing months of sunny days. Therefore, except on the high Alpine rim of the Mediterranean Basin, the flocks and herds grazing

on the mountain pastures have always had to eke out their grass diet by the fresh shoots and accessible twigs of the deciduous trees. This supplementary fodder was undoubtedly more abundant and varied in ancient times than now, when the forests are the thin and deteriorated residue left by centuries of denudation. Moreover, the original forest covering conserved the moisture in the soil of the slopes, and thereby maintained a richer pasturage of herbs and grasses than exists there today.

The quality of the mountain pastures declined from north to south and from west to east within the long flattened ellipse of the Mediterranean lands, and it fell off rapidly from the more rainy western flank of mountainous coastland or peninsula to the rain-shadow on the eastern side; for in these directions the summer drought increased in length and intensity. The northern mountains, whose rainfall approximated the all-year precipitation of middle Europe, had good and reliable summer pastures which supported herds of horses, cattle and mast-fed pigs, besides flocks of sheep and goats. The southern mountains, located below the 40th or 41st parallel, were covered up to 2,000 or 3,300 feet (600 to 1,000 meters) with the typical thorny and leathery Mediterranean vegetation, varied by occasional groups of deciduous trees growing in deeper pockets of soil, where humus and moisture collected. These lower slopes furnished pasturage fit only for sheep and goats, except in spring and the warm rainy autumn when the short-lived grasses lifted their green stalks.

Above this limit the less fastidious flocks found ampler and better pasturage. Cattle and horses, however, which needed succulent herbage, found suitable grazing only in high level valleys or lake basins which combined deep soil with summer showers, like the lake-strewn highlands of ancient Arcadia and Epirus or the longitudinal valleys of the Apennines. In the more arid southern zone, the best summer pastures were located on westward-facing ranges, like the western Apennines, the mountains of Elis, and the high valleys of "many-fountained" Ida, whose cattle pastures in Homeric days reflected the location of this Mysian mountain between rain-bearing winds from the Aegean Sea and those from the Propontis or Marmora. Mountains or limestone plateaus which barely attained the critical elevation of 3,300 feet (1,000 meters), like the Judean Plateau or the Barca Plateau of northern Africa, yielded ephemeral grasses even on their summits. These countries, therefore, had to restrict the raising of horses and cattle to the scant water-soaked or irrigable lowlands at their base, or draw on the stock of the pastoral nomads along their steppe borders. Only sheep and goats, led about by some boy shepherd of the hills, could thrive on these uncertain upland pastures.

RELATION OF STOCK-RAISING TO SEDENTARY AGRICULTURE.—Conditions of climate and relief in Mediterranean lands greatly restricted stock-raising as an adjunct of sedentary agriculture. In fact, the two industries were pretty effectually divorced. The flocks and herds fed in winter on the untilled lands, the lowland meadows, and stubble fields of the home farm; but before the advent of summer they were driven out for their half-year on the highland pastures. This is the rule also today. The author has seen sheep feeding on the crest of the Cithaeron range (elevation 2,800 feet or 850 meters) between Attica and Boeotia in early April, while 100 miles farther north the flocks were still grazing on the lake plain of Thessaly, because the middle and upper slopes of the Olympus massif were covered with snow. This divorce of stock-raising from tillage had a marked influence upon the latter. For six months the manure of the flocks and herds was lost to the home fields. To replace it the ancient Mediterranean farmer had to exercise a Chinese-like economy in devising various other fertilizers, even to the ploughing-in of green crops as early as 400 B. C.;¹ but he probably never compensated the soil for the moisture-conserving qualities of the animal manures.

Owing to the lack of home pastures, moreover, the animals kept on the farm were restricted to the imperative needs of agricultural labor, and were stall-fed throughout the year. Their feeding, moreover, called for the utmost economy. The arable land, scant at best because of the predominant mountainous relief, was carefully apportioned to field crops, gardens, fruit orchards, olive plantations and vineyards, according to its suitability for each. Meadows for hay or forage crops could be maintained through the summer only by irrigation; but irrigable fields were scarce and valuable. Natural meadows were confined to wet lands too low to be drained,² and were usually of small extent. Fodder crops of great excellence were raised, but forage was doled out to the work animal with a skimping hand. The ancient farmers cultivated various fodder legumes by irrigation during the dry season, reaped several harvests therefrom where the water sufficed, and let the fields serve for green forage during the winter.³ They relied chiefly on alfalfa or Medic clover (*Medicago sativa*), which was introduced into Greece by the invading Persians in 490 B. C. It yielded four to six crops a year and lasted ten years from one sowing.

¹ Xenophon, *Oeconomicus*, XVII, 10.

² Theophrastus, *Historia Plantarum*, Bk. IV, ch. VIII, 13. Aristotle *De Animalibus*, VII, ch. 23, 6. Naumann and Partsch, *Physikalische Geographie Griechenlands*, p. 404. Breslau, 1885.

³ Pliny, *Historia Naturalis*, Bk. XVIII, ch. 30-43. Columella, Bk. II, 7 and 10; Bk. V, 12.

To free it from weeds, it was cut close to the ground each spring. The weeds thereby perished, but the alfalfa survived, owing to its deep root system.⁴

Barley and spelt, an inferior wheat, were the feed grains for stock throughout the Mediterranean basin. Rye and oats, which required a moist climate, were for a long time scarcely known. Oats were regarded as a harmful weed in Virgil's time,⁵ but a few decades later Columella mentions them as a fodder crop.⁶ Rye was raised only in the moister northern parts of the Mediterranean region. Thracians and Macedonians planted it in the 2nd century,⁷ and probably earlier, in the 4th century B. C., if Theophrastus is correct. The ancient Taurini, who occupied the upper Po valley about Turin and whose name indicates a cattle-raising folk, raised rye in their well-watered territory.⁸ Pliny mentions rye in a mixed fodder crop of rye, spelt and beans,⁹ a combination which shows how far the Roman farmers had advanced in the art of feeding cattle, after the enormous grain importations into Italy caused field agriculture to be superseded by stock-raising.

KIND, NUMBER AND DISTRIBUTION OF THE ANIMALS RAISED.—The character of Mediterranean pasturage determined the kind, number and distribution of the animals raised. Pigs were associated with the rainier districts of the north and west, where mast-yielding forests abounded; they were eliminated by climatic conditions from Palestine, Syria, and the semi-arid interior of Asia Minor. In all these regions the climatic inhibition was echoed in a religious taboo. Sheep and goats represented the survival of the fittest for Mediterranean pasturage, and therefore began their successful competition with other kinds of stock at an extraordinarily early date. On the dry fields of Palestine they alone could nibble a living from the poor, thin herbage. Though exempt from farm labor, they furnished milk, cheese, leather, wool and hair for textiles. When slaughtered for meat, their small size was an advantage in iceless homes and in a region where the winter cold rarely sufficed to freeze meat.

Cattle and horses, on the other hand, which required good feeding, were associated even in the time of Homer and Solomon with advanced

⁴ Aristotle, *History of Animals*, III, 21; VIII, 8. Strabo, XI, ch. XIII, 1, 7. Pliny, Bk. XVIII, ch. 16.

⁵ Vergil, *Georgic*, I, 77. Pliny, Bk. XVIII, 149.

⁶ Columella, II, 19, 32.

⁷ Galen, VI, 514.

⁸ Pliny, Bk. XVIII, ch. 16, 40.

⁹ Varro, I, 31, 5. Columella, II, 7, 2. Pliny XVIII, ch. 16, 41.

sedentary agriculture, the possession of marsh meadows, and the maintenance of fodder crops through the dry season by means of irrigation. Their presence reflected quite accurately the geographic possibilities of good or fair summer pasturage. They were therefore rare in Palestine but relatively abundant in Italy, whose long narrow peninsular form, high relief and more northern location curtailed the dry season and insured occasional summer showers, while its extensive plains of moist or swampy alluvium provided conditions for wet pastures in the Po, Arno and Adige valleys and certain coastal lowlands. These conditions also permitted Italy to abandon field agriculture, as opposed to horticulture and viticulture, and to resort to stock raising on a large scale, when Rome's over-rapid territorial expansion and the enormous importation of foreign grain had ruined the small peasant.

MEAT DIET IN MEDITERRANEAN LANDS.—The pasturage conditions were further reflected in the amount and kinds of meat used as food in the ancient Mediterranean world. While the flood-plain of the Nile supported cattle, sheep, goats and pigs in relative abundance and supplied meat to the tables of the well-to-do, everywhere else the meat diet was restricted, just as it is today. In Palestine and Greece, a religious festival attended by the sacrifice of a ram, lamb or kid was the chief occasion for the appearance of meat on the table of the common people. These conditions held in Palestine from the earliest times and emphasized the importance of olive oil as a substitute, as revealed all through the Scriptures. The consumption of beef decreased from north to south and from west to east. Except in Italy, it declined also from the earlier to the later epochs with the deterioration of the mountain pastures and the growing pressure of population upon the irrigable lands of the plains. The sustaining food of beef and swine meat which characterized Homeric Greece was greatly attenuated by the 7th Century B. C., and by the 5th century came rarely on the daily table. A goat or a pig was the treat for a festival in Athens, and beef was enjoyed by the common man only at public banquets on the occasion of public sacrifices.¹⁰ Lucky people like the Thessalians and Boeotians, who had good pastures and fat kine in their old lake basins, were scorned as gluttons but were none the less envied. If Solon forbade the sacrifice of an ox for a funeral feast as a sumptuary law in the interest of economy,¹¹ this prohibition may reflect the increasing price of cattle in Attica, a land poor in pastures.

¹⁰ E. Speck, *Handelsgeschichte des Altertums*, vol. II, pp. 537-8. Leipzig. 1901, W. S. Davis, *A Day in Old Athens* p. 180. Boston, 1914.

¹¹ Plutarch, Solon, XXI.

Meat was a luxury for feast days also in the early Republic of Rome; but with the rapid acquisition of more ample and nutritious pastures, as the northern Apennines and the Po valley were conquered and annexed, and with the transition to large-scale stock farming following the second and third Punic wars, beef became a more common article of food; lamb, mutton and goat's meat were cheap, and every form of *porcina* or hog meat was in general demand.¹² Meat figured conspicuously as food among the large patrician and official classes of the capital, where wealth was centralized, and therefore doubtless occasioned the sharp advance in the market price of all cattle which made the older Cato rank stock-raising as the most remunerative branch of tillage;¹³ but among the growing proletariat and the vast number of slaves, salt-fish, supplemented by the poorer grades of olives and olive oil, probably took the place of meat, as it did among the common people of Greece.¹⁴ In the early centuries of the Roman Republic, when a balanced system of agriculture prevailed, and at all times elsewhere in the Mediterranean world an immense impulse was given to the ancient fisheries by the need to supply the place of meat. The wide sea ventures of the ancient tunny fleets, therefore, may be regarded as the joint effect of ample coastlines and meager pastures. And when the early Christian church imposed meatless days or fasts upon the Greek and Roman adherents within the Empire, the restriction worked little hardship to the mass of the people, whose dietary stand-by was salt fish. This reflection leaves us with the query how far climatic conditions may discount the merit acquired by certain religious observances.

The scrupulous economy of the grazing and meadow lands in the ancient Mediterranean world reveals itself in various secondary or derivative effects of geographic conditions. Cows and oxen were raised at a minimum cost on the out-pastures of the mountains and marshes, and brought to the home farm when old enough to work. There they were employed for agricultural labor in preference to the horse, which had fewer economic uses and yet required the best feed. We read of ox-wagons and horse-carts in Athens, used to transport building materials to the Acropolis in the time of Pericles,¹⁵ but mules and oxen were more generally employed as draft animals.¹⁶ The unassuming ass was the pack-animal for the rough mountain paths and ill-made

¹² H. Blümner, *Die Römischen Privataltertümer*, pp. 174-175. Munich, 1911.

¹³ Cicero, *De Officiis*, II, 25.

¹⁴ E. Speck, *Handelsgeschichte des Altertums*, vol. II, p. 477. Leipzig, 1901.
Boeckh, *Staatshaushaltung der Athener*, Vol. I, pp. 127-130. Berlin, 1886.

¹⁵ Plutarch, Pericles, XII.

¹⁶ A. E. Zimmern, *The Greek Commonwealth*, p. 270. Oxford, 1911.

tracks which prevailed in the Mediterranean world before the expansion of the imperial road-builders of Rome.

THE HORSE IN MEDITERRANEAN LIFE.—In most Mediterranean lands, horses appear as luxury articles from very early times. Only in the northern and rainy parts of the region, where good pastures were found, did horses become a commonplace. Owing to the cost of raising and maintaining them, they were the luxury of the rich, the special privilege of nobility and royalty, whether among the Jewish kings and princes of ancient Palestine,¹⁷ or the Greek and Trojan chieftains warring on the plains of Ilium;¹⁸ whether among the landed aristocracy of the *Hippobotae* or "horse feeders" of Greek Euboea, or the wealthy class of *Hippes* who constituted the small equestrian order of Athens in the 7th and 6th centuries B. C.,¹⁹ or the *nouveau riche* of Rome who formed the order of the *equites* or knights, among whom the gold ring, the purple-bordered toga and the prancing steed, were the badge of all their tribe. The Eupatrid family of the Alcmaeonides of Athens, like other noble clans of the commonwealth, acquired riches, raised horses on their landed estates, won prizes in the four-horse chariot races in the Olympic Games, and thus arrived at distinction.²⁰ Vergil specifies the raising of fine sleek-coated horses as the congenial occupation and conspicuous characteristic of the Trojan and Roman nobles.²¹ When the poet describes the equestrian evolutions of the Trojan lads at the *Ludus Trojae* or funeral games of Anchises in Sicily, he makes it clear that only the little aristocrats of Aeneas' exile band participated in this miniature cavalry display.²² Does some such fact as this explain the patrician beauty and noble bearing of the mounted boys in the frieze of the Parthenon? No beggar ever got on horseback in the Mediterranean region: that edifying spectacle was reserved for rainier lands.

Cavalry and chariot service in war became the obligation of the rich, and made horses the concomitant of war throughout the Mediterranean.²³ Aside from their appearance in religious processions, sacred games and races, war was their essential use. The amount of cavalry which each country could command depended upon the supply of wet meadows and therefore often fluctuated with the expansion and

¹⁷ II Samuel, XV, 1. I Kings, I, 5. Jeremiah, XVII, 25.

¹⁸ J. D. Seymour, *Life in the Homeric Age*, p. 349. N. Y. 1907.

¹⁹ Herodotus, V, 77. Plutarch, Pericles, XXIII. Aristotle, Politics, VI, 7.

²⁰ Herodotus, VI, 125. E. Curtius, *History of Greece*, vol. I, p. 369. N. Y. 1867.

²¹ Vergil, *Aeneid*, VI, 653-655.

²² *Ibid.* V, 558-570.

²³ *Ibid.* I, 444; VI, 653-655. Proverbs, XXI, 3.

contraction of the national frontiers, as the boundaries included or excluded such natural pastures. The few states with abundant and superior pastures became famous for their cavalry and were sought as allies in war; from them horses were purchased or mounted troops were hired by commercial states of large revenue like Athens, which in the days of its wealth could import horse feed. Horses, like cattle, were scarce in Athens, where climate, relief and the composition of the soil were all adverse to good pasturage. Therefore the Athenian cavalry was always small, only 100 to 300 horsemen originally,—a negligible force at the Battle of Marathon,—and never numbering more than a thousand, who were occasionally reinforced by mounted Scythian bowmen.²⁴ Hence the Athenian state, in the protracted wars with its rivals, always sought the alliance of the few Greek commonwealths which had a numerous cavalry.

The prevailing rugged relief of the Mediterranean lands tended to restrict the employment of cavalry and chariots in war, and in some districts quite inhibited their use. It dictated the choice of broad and level battlegrounds by generals with strong mounted forces, who therefore manoeuvred for place. Thus the northern Syrians and Philistines, who had numerous chariots, drew the horseless Israelites into battle in the lake-plain of Merom and the plain of Esdraelon.²⁵ The Persian invaders of Greece in 490 B. C. selected the plain of Marathon for their decisive battle, by the advice of the traitor Hippias, and later the plain of Platea, because the defending forces were weak in cavalry and the Persians were strong.²⁶ Attica was not a country whose terrain permitted the free operation of mounted troops, but Boeotia was;²⁷ hence the significance of the battle fields of Chaeronea and Coronea, located in lake and valley plains of Boeotia, for the Macedonian conquest of Greece. Hannibal, on his invasion of Italy, could employ his Numidian cavalry to an advantage in the broad Po lowlands at Ticinus and Trebia, the lake plain of Trasimenus and the coastal plain of Apulia at Cannae. When caught by the Romans in a mountain valley where his cavalry was useless, he escaped from the trap by strategy.

ECONOMY OF PASTURES AND IMPROVEMENT OF ANIMAL BREEDS.—The paucity of the Mediterranean pastures necessitated their intelligent and economic use. This requirement led to the improvement of the animal breeds by artificial selection at an early period, in Egypt

²⁴ A. Boeckh, *Die Staatshaushaltung der Athener*, vol. I, pp. 330-333. Berlin, 1866.

²⁵ Joshua, XI, 4, 5. 1 Samuel, XIII, 5. Judges, IV, 3; V. 19-22.

²⁶ Herodotus, VI, 102.

²⁷ Herodotus, IX, 13.

even under the old Empire in 3,000-2,500 B. C.²⁸ It was well established in Greece in the time of Aristotle or earlier; it developed into a broadly applied system in Italy and Sicily, and appeared in Cyrene, Africa and Spain. The process was fostered by the early live-stock trade, due to the uneven distribution of pasturage, which sprang up between districts of good and poor grazing. Surplus animals from all the pastoral hinterlands reached the Mediterranean markets where they were exchanged for grain or manufactured commodities. Occasionally they came as tribute; and since the kind and breed of animals were generally specified by the law imposing the tributes, such animals were probably the best of their kind. This was particularly true in the case of horses. Overseas trade in live-stock was facilitated by the early development of horse transports as a branch of the merchant marines of both Phoenicia and Greece. Aside from the imperative need of transporting cavalry for war, which was well established by 490 B. C.,²⁹ the risk and expense of taking animals on long voyages in small boats must have been prohibitive except for choice specimens which would command high prices; and these would naturally be used for breeding purposes. We hear of Venetian horses in Sparta in the middle of the 7th century B. C.³⁰ Fine horses and mules of racing stock were brought from African Cyrene and various cities of Sicily as early as 494 B. C. to compete in the sacred games of Greece at Corinth, Delphi and Olympia.³¹ It is easy to imagine that the sacred precincts of the games became the scene of busy horse trading after the prizes had been awarded, and that thus various strains were mixed and eventually improved.

The evidence points to a very early importation of the superior Thracian horses into Italy. Vergil would hardly have dared to make Aeneas find Thracian horses the property of the local kings in Sicily and Latium,³² if the anachronism had been all too violent. The fact that the Carthaginians employed horse transports in 488 B. C. in a military expedition to Sicily³³ suggests that they may have earlier imported choice animals from Phoenicia to stock their big landed estates in Africa, as is indicated in the Aeneid when Dido presents the boy Ascanius with a fine Sidonian steed.³⁴ The nature of the horse as a luxury article and its highly specialized use for chariot

²⁸ Erman, *Life in Ancient Egypt*, pp. 436-438. London, 1894.

²⁹ Herodotus, VI, 95; VII, 87, 97.

³⁰ E. Speck, *Handelsgeschichte des Altertums*, vol. II, p. 483. Leipzig, 1901.

³¹ Pindar, Odes, Pyth. I, II, III, VI; Olym. I-III, VI; Nem. IX.

³² Vergil, Aen. V, 565-567.

³³ Diodorus Siculus, Bk. XI, chap. II.

³⁴ Vergil, Aen. V, 571.

racess and war, requiring speed and endurance, doubtless contributed to the early improvement of the equine strains through artificial selection, and therefore to a peculiarly discriminating trade in the animal. The horse breeds were improved also by superior feeding, by the reservation of the best green pastures for the mares and colts, and by the maintenance of stud-farms at great distances, wherever natural pastures afforded green fodder all year round. This was noticeable among Macedonian, Greek, Sicilian, and Roman nobles and plutocrats.

Regions of export for selected breeds of horses and cattle were characterized by marsh-meadows, heavy rainfall with summer showers, or by the moist soils of lacustrine basins surrounded by high mountains. Such regions were Egypt and the Cilician lowland; Thrace, Thessaly, Messinia, Arcadia, Elis, Argos and Epirus in Greece; Apulia, the Po valley, and Venetia in Italy, together with Sicily. In the Iberian peninsula only the Guadalquivir lowlands or Baetica had attained a sufficiently advanced economic development to yield superior breeds.

The best sheep and goats were sought for breeding purposes in regions of dry pasturage near old industrial centers famous for their textiles, like Miletus, Megara, Athens, Tarentum, Corduba and Gades. These districts had selected their breeds for the fineness, length and color of their wool or hair; and further to improve the quality of the fleece, they covered the sheep with skins.³⁵ Diogenes said that the children of the Megarans ran about naked, while their sheep were clothed. This trade in improved strains began very early. We read, for instance, that Polycrates of Samos (532 B. C.) imported goats from the islands of Naxos and Seyros, sheep from Attica and Miletus, and swine from Sicily.³⁶ The demand for wool and goat's hair for textiles was imperative. Cotton was as yet unknown to the Mediterranean farmers, and the cultivation of flax for fibre was practically restricted to Egypt for centuries, for there chiefly was found the rich, moist alluvial soil which it required. Such soil was found in other Mediterranean lands in limited quantities, and seldom could it be spared from the more important wheat, especially since both Hebrew, Greek, and Roman farmers knew that flax exhausted the ground.³⁷ Therefore flax culture came late into Italy and then was centered in the alluvial plains of the Po valley.³⁸ Linen was sparingly used for

³⁵ H. Blümner, *Gewerbe und Kunst bei Griechen und Römern*, vol. I, pp. 91-98, Leipzig, 1875.

³⁶ Athenaeus, XII, 57.

³⁷ H. Vogelstein, *Landwirtschaft in Palästina zur der Mischmah*. Berlin, 1894. Columella, II, 10, 17. Theophrastus, *De Causis Plantarum*, IV, 5, 4.

³⁸ Pliny, XIX, 9.

clothing even in the first century of the Empire, when it was a luxury article for the Caesars and the rich.³⁹ In contrast, every rocky island unfit for tillage supported flocks of goats, while goats and sheep flecked every mountain side in summer, and drifted over every plain and hill in winter.

Let us now examine the various Mediterranean countries in the light of these general principles, and get the picture of stock-raising in each from the data which have come down to us.

STOCK-RAISING IN EGYPT.—Ancient Egypt had cattle and horses in abundance both for home use and export. In time of famine they were exchanged for the government grain under Joseph's rule.⁴⁰ To the Greeks the Nile was "the stream where graze the goodly kine."⁴¹ Compare the vision of Pharaoh before the seven year's famine: "There came out of the River seven well-favored kine and fat-fleshed, and they fed in a meadow."⁴² The inundations of the Nile irrigated an area large enough both for plough land and pasture. Moreover, the marshes of the Delta, which remained unreclaimed long after the river valley proper had been brought under cultivation and which were in part unreclaimable, furnished natural pastures when the fodder supply in the farm land ran low, prior to the summer flood. Thither the cattle were driven from the south every year, and were entrusted to the local marsh-men. These were an uncouth people but professional herdsmen; they still persisted as such in the time of Marcus Aurelius (180 A. D.), when the Romans called the marshes of the Delta the *bucolia* or cattle pastures.⁴³ The Nile valley furnished various irrigated forage crops, which fed the home cattle and horses penned up in the mound villages during the summer floods.⁴⁴ Under these favorable geographic conditions, Egypt from 3000 B. C. maintained a careful system of cattle-breeding, which resulted in several varieties of ordinary and humped cattle;⁴⁵ and it supported the horse-breeding industry which supplied an export trade to Palestine, Syria and the Hittite country of Asia Minor.

The Egyptian horses were carefully bred and were evidently superior to the native stock of south-western Asia, because they commanded

³⁹ H. Blümner, *Die Römischen Privataltertümer*, p. 241. Munich, 1911.

⁴⁰ Herodotus, II, 37; Genesis, XLVII, 15-18.

⁴¹ Aeschylus, *The Suppliants*, 834.

⁴² Genesis, XLI, 2.

⁴³ A. Erman, *Life in Ancient Egypt*, pp. 439-444. London, 1894; Mommsen, *Provinces of the Roman Empire*, Vol. II, p. 284. New York, 1887.

⁴⁴ Diodorus Siculus, Bk. I, ch. III, 36.

⁴⁵ A. Erman, *Life in Ancient Egypt*, pp. 436-437. London, 1894.

high prices in export. The large number of chariots and cavalry in the Egyptian Armies from the 14th century, B. C. indicates horse-raising on a big scale. This was rendered possible by the ample grain and fodder crops of the Nile valley, and in turn it rendered possible the broad artificial selection which improved the breed. The original equine stock came in with the Hyskos invaders (1700 B. C.), but it was probably improved by crossing with the fine horses of the Libyan tribes, who began pushing into the western margin of the Delta from the 13th century. These nomads, like the later Bedouins, apparently developed an animal distinguished by speed and endurance, in response to the requirements of thinly scattered pasturage, desert warfare and border raids. The excellence of this Libyan breed reappeared in the race horses of Cyrene, which frequently carried off the prizes in the Olympic Games.⁴⁶

STOCK-RAISING IN PALESTINE.—Palestine, because of its climate, geology, relief and the deep Jordan rift which makes the highland overdrained, has always had scant natural grazing for cattle and horses, though sheep and goats can find enough forage of a poor kind. But flocks and herds alike suffered from the frequent droughts or half-droughts which visited the land, when cow and ewe, like the hart, “panted for the water-brooks.” The ancient breed of sheep was undoubtedly the broad-tailed variety, which probably came from arid Asia by way of Arabia.⁴⁷ It was fortified against a season of poor pasturage by the store of fat in the immense tail, translated “rump” in the Bible but now given as “fat tail” in the revised version.⁴⁸ The limestone plateau of Judea and the lower Negeb to the south were covered with herbage after the March rains, and furnished a nutritious but transitory pasturage. Here in the spring grazed “the cattle upon a thousand hills” of which the psalmist sang⁴⁹ with more religious fervor than scientific accuracy. By midsummer all was parched and brown. Earlier still faded the belt of green to the east and south, the short-lived “pastures of the wilderness.”⁵⁰ The flood plain of the lower Jordan, which the sheik Lot selected for his portion of Palestine because it was well-watered, was indeed saturated with moisture after the melting of the snows on high Hermon (8,700 feet or 2,653 meters)

⁴⁶ O. Keller, *Die Antike Tierwelt*, Vol. I, pp. 219-221, 1909. W. Ridgeway, *Origin and Influence of the Thoroughbred Horse*, pp. 216-223. Cambridge, 1905.

⁴⁷ Herodotus, III, 113.

⁴⁸ Exodus, XXIX, 22; Leviticus, III, 9.

⁴⁹ Psalms, I, 10.

⁵⁰ Joel, I, 18-20.

to the north; but its grass soon perished in the furnace heat of the deep rift (1,293 feet or 394 meters below sea-level).

Only on the narrow coastal plain of Sharon and the valley floor of Esdraelon did the grass never wholly fail in summer. These therefore were the chief natural pastures for the cattle of King David.⁵¹ Both districts are fed by springs from the porous limestone plateau and have a high water-table which ensures a modicum of moisture to their soil. Sharon extends 50 miles from Joppa to Carmel, with a varying width of 6 to 12 miles. Swamps half a mile wide border its streams, whose outlets are obstructed by the coastal dunes, and many small lagoons are strung along its shore. Sharon is today a district of pastures and scattered farms, between which stretch belts of evergreen oak, the remnant of the forest described by Strabo and Josephus.⁵² Much of it was under cultivation in ancient times, but the remainder yielded the best pasturage of Palestine and nourished superior cattle, which are praised in the Talmud.⁵³ The old lacustrine plain of Esdraelon, surrounded by Mount Carmel and the hills of Samaria and Galilee, located farther north than Sharon and better watered, is a natural meadow land. Its broad, level floor lies so little above sea-level and has such a slight drainage slope that much of it is marshy during winter and spring, so that the modern road crosses it on a dyke. This is the plain where Sisera and his 900 war chariots got mired during a battle when the Lord sent a sudden storm to assist the Israelites.⁵⁴ The value of these wet meadows was recognized in ancient Palestine. "Blessed are ye that sow beside all waters, that lead out thither your ox and your ass." The Bible gives a picture of poor and uncertain grazing for the larger animals elsewhere west of Jordan. Allusions to "fat pastures" and "large pastures" occur only when the prophets, in rare moments of optimism, indulge in hyperbole to describe the material blessings promised to a repentant Israel⁵⁵ by an irascible deity, whose moods varied with the weather, not as an effect but as a cause.

East of Jordan, the plateau belt of Gilead, Golan and Bashan rises 2,600 to 4,400 feet (800 to 1,300 meters) above the sea, and receives from 16 to 24 inches (400 to 600 mm.) of rainfall in Golan, but less in Gilead to the south.⁵⁶ This sufficed in ancient times, as

⁵¹ I Chronicles, XXVII, 29.

⁵² General Staff Map, No. 2321, Jaffa Sheet. E. Banse, *Die Türkei*, p. 371, Braunschweig, 1919.

⁵³ Hastings, Dict. of the Bible, article Sharon. Isaiah, XXXV, 2; LXV, 10.

⁵⁴ Judges, IV, 3, 13; V. 19-22.

⁵⁵ Ezekiel, XXXIV, 14. Isaiah, XXX, 23.

⁵⁶ E. Banse, *Die Türkei*, pp. 361-362. Braunschweig, 1916.

today, for good or even excellent grasslands,⁵⁷ over which cattle wandered in a half-wild state in charge of nomadic herdsmen. Such were the "bulls of Bashan" and the herds whose yield figured in the tribute paid to the kings of Israel and Judea, and in the produce sent to the western markets. This district furnished booty in the form of cattle to the Israelite conquerors;⁵⁸ and it was appropriated by the tribes of Gad who were essentially herdsmen.⁵⁹

The small natural meadows of ancient Palestine seem to have been reserved for the cows and oxen which performed the farm labor of ploughing and treading out the grain, and which served also for food and religious sacrifices. There is little evidence of efforts to improve breeds. Cows were kept to maintain the supply of oxen; their milk-giving ability was small, owing in part to the inferior pasturage and their constant labor. For the same reasons the cattle were small and short-limbed, but tolerant of the harsh conditions.⁶⁰ The regulations of Leviticus, which exacted victims without blemish for sacrifice in the temple, may have been an adroit priestly method to encourage discriminating breeding; but this was possible only to a limited degree, since the majority of the stock ran free on the highland or lowland pastures.

HORSES IN PALESTINE.—Nowhere else were horses so great a luxury as in Palestine. Before the Jewish conquest, the Philistines of the coastal plain had numerous horses and chariots,⁶¹ and so had the Canaanites who occupied the plain of Esdraelon and the moist lake-basin of Merom;⁶² but the native tribes of the upland seem to have had none. When the Israelites invaded Palestine and established themselves on the rugged Judean plateau, they saved the cattle taken in their conquest, but were instructed to hamstring the horses,⁶³ because the land afforded no suitable pasturage. The earliest laws, embodied in the book of Deuteronomy, were the result of about three centuries of practical experience in Palestine. They forbade the kings to breed horses or to import them from Egypt for breeding purposes.⁶⁴ But later, when David and Solomon had extended the frontier of their domain from the Mediterranean coast to the Arabian Desert, and northward to the great bend of the Euphrates, the pasturage situa-

⁵⁷ Libbey and Hoskins, *The Jordan Valley and Petra*, vol. I, pp. 107-8. N. Y. 1905.

⁵⁸ Deuteronomy, III, 7-8.

⁵⁹ Numbers, XXXII, 1-5.

⁶⁰ Hastings, *Diet. of the Bible*, art. Food.

⁶¹ Judges, I, 19.

⁶² Joshua, XI, 4-7, 14.

⁶³ Joshua, XI, 9, 14.

⁶⁴ Deuteronomy, XVII, 16.

tion was improved, because the kingdom included the plains of Sharon, Esdraelon, and Coelo-Syria, the broad fertile valley between the Lebanon and Anti-Lebanon Mountains, which provided both natural and irrigable meadows.

David deviated from the old rule after his victory over the northern Syrians by reserving from the booty horses for a hundred chariots⁶⁵ or probably three hundred animals. All the rest he disabled. Solomon went into horse-breeding on a large scale and made it a royal monopoly.⁶⁶ He received both horses and mules as tribute, doubtless from Gilead and Damascus, where the kings had chariots⁶⁷ and also from the northern Syrians; and he imported from Egypt droves of horses at a cost equivalent to \$100 per head, to supply the cavalry and chariot corps of his army,⁶⁸ which was enlarged to protect the wide frontiers of the new Empire. From this time horses were royal beasts, associated with war. They were chiefly stall-fed on barley and straw.⁶⁹ The temporary expansion of the Jewish kingdom to the Mediterranean gave Solomon control of the great caravan route along the maritime plain, and made him the sole middleman in the horse trade between Egypt and the Syrian and Hittite kings of the north.⁷⁰ The Tel Amarna letters indicate that these rulers made an active demand for the Nile horses, which were doubtless a superior breed. Solomon also purchased stallions from Cilicia, probably to sell them again to Egypt to improve the strain there.⁷¹ Lowland Cilicia, located between Mt. Amanus and the Taurus system, was a broad, well-watered alluvial plain, abounding in marsh meadows. As its tribute to Darius the Persian in 500 B. C. consisted of 360 white horses,⁷² its equine breed was probably superior. After the division of the Jewish kingdom, the plains of northern Palestine or Israel continued to raise horses, but rugged Judea had to rely on importations from Egypt, despite the protests of the prophets.⁷³

STOCK-RAISING IN PHOENICIA AND SYRIA.—Narrow, rugged Phoenicia, with its terraced mountain sides devoted to gardens and orchards, offered little feed or pasturage for animals, and little opportunity for their employment. Hence cities like Tyre and Sidon imported sheep

⁶⁵ II Samuel, VIII, 3-4.

⁶⁶ I Kings, X, 25-26.

⁶⁷ II Kings, IX, 16, 20; V. 9.

⁶⁸ I Kings, X, 28-29. II Chronicles, IX, 28.

⁶⁹ I Kings, IV, 28.

⁷⁰ I Kings, X, 28-29.

⁷¹ Maspero, *Struggle of the Nations*, pp. 215-216, 739-740. N. Y. 1897.

⁷² Herodotus, III, 90.

⁷³ Isaiah, XXXI, 1. Ezekiel, XVII, 15.

and goats from the nomad tribes of Kedar in northern Arabia, and wool from Damascus. From Armenia (Togarmah) they bought war horses and mules,⁷⁴ which they probably sold again farther south in Palestine or Egypt. Armenia was a famous horse-breeding region in ancient times and used to pay to the Persian kings an annual tribute of 20,000 foals⁷⁵ which fed on its high Alpine pastures in summer, and in winter on the produce of its fertile valleys, as the horses of the wandering Kurds do today. The hinterland of the Phoenician seaboard was Coelo-Syria or the Lebanon trough, which afforded the largest and best pasture area of all Syria. The trough, which forms a broad U-shaped valley of gentle gradient, is drained by the Leontes and Orontes rivers, which rise in a swampy, indeterminate watershed near Baalbek at an altitude of 3,500 feet. The Orontes, the longer stream, takes a leisurely course northward through an almost level plain, and at intervals spreads out in broad shallow pools, bordered by marshes,⁷⁶ which in ancient times created extensive meadows for horses and cattle. Reclaimed in part for irrigated fields, the plain fed the ancient populations of Kadesh, Hemesa (Homs), Hamath, Apameia and Antioch.⁷⁷ After Alexander's conquest of Syria, the wet meadows formed by the Orontes near the city of Apameia were selected for the royal Macedonian stud-farm, which kept 30,000 brood mares and 300 stallions.⁷⁸ This is part of that Syria whose chariot and cavalry forces wrought havoc among the armies of the Kingdom of Israel.

STOCK-RAISING IN ASIA MINOR.—Asia Minor, owing to its more northern location, its peninsula form and high elevation, had a well assured rainfall along its coasts, especially on the west and north where the precipitation ranged from 25 to 40 inches (625 mm. to 1,000 mm.). In the mountain rimmed interior of the plateau, steppes and salt deserts prevailed, where cattle, wild asses and sheep roamed at large over dry or saline pastures,⁷⁹ or in summer ascended the inner valleys of the encircling mountains as they do today.⁸⁰ The products of this semi-arid hinterland were probably one source of the fine wool which through the ages has sought the industrial cities of the Aegean littoral and supported their textile industries. Phrygia Major, which lay just east of Lydia at the head of the mountain valleys opening westward

⁷⁴ Ezekiel, XXVII, 14, 18, 21.

⁷⁵ Herodotus, V, 49. Strabo, XI, ch. XIV, 4, 9.

⁷⁶ E. Banse, *Die Türkei*, pp. 315, 333-338. Braunschweig, 1916.

⁷⁷ Mommsen, *Provinces of the Roman Empire*, vol. II, p. 148. N. Y. 1887.

⁷⁸ Strabo, XVI, ch. II, 10.

⁷⁹ Strabo, XII, ch. II, 7, 9; ch. III, 8; ch. VI, 1.

⁸⁰ Banse, *Die Türkei*, pp. 98-114.

to Aegean winds, got hardly less rain than the coastal belt (400-500 mm.),⁸¹ and therefore, Herodotus says, was famous for its wheat and cattle among the ancient Greeks of Ionia and the Carian seaboard. Cappadocia comprised the high eastern portion of Anatolia, 3,300 feet or 1,000 meters, and included in its area the lofty *massif* of Mount Argæus (13,000 feet or 4,000 meters), an old volcano, whose lower slopes and piedmont, covered with a rich soil of weathered trachyte, tufa, and lava, merge into the fertile fields and meadows of Caesarea.⁸² This region produced the immense number of horses, mules and sheep sent yearly as tribute to the Persian kings, and the famous Cappadocian race-horses of the Roman Circus.⁸³

Western Asia Minor was a part of the ancient Aegean world, so far as its broad embayed littoral was concerned. Its early activities in stock-raising are therefore interwoven with those of the Greek people, by whom it was colonized. In the *Iliad* and *Odyssey*, horses and cattle belonged to sedentary agriculture, which presupposed irrigated fodder crops and wet meadows, and they therefore shared the honor due to the highest civilization of Homeric times.⁸⁴ But their distribution around the Aegean circle of lands shows a close connection with geographic conditions. Saturated river lowlands, deltaic flats, and lacustrine basins seem to produce horses and cattle as naturally as the reeds growing in the moist soil. In such places were found the flowery meadows and level stretches of rich soil which the Homeric Greeks loved for their cattle and horses.⁸⁵ Beside every green pasture was the meandering brook or reedy pool, recalling the *prata recentia rivis* of Vergil.⁸⁶ "The kine that are feeding innumerable in the low-lying land of a great marsh" give us the typical picture,⁸⁷ or the horses of Achilles "cropping clover and parsley of the marsh" on the Troad coast.⁸⁸ Of a Trojan prince we are told, "Three thousand mares with their colts had he, that pastured along the marsh meadow," where the Simois and Scamander rivers had deposited their silt on the flat coast,⁸⁹ forming swamps and lagoons about their obstructed outlets.⁹⁰ Enops tended "his herds near the banks of the Satnoeis,"

⁸¹ *Ibid.* p. 114.

⁸² *Ibid.* pp. 98-104.

⁸³ Strabo, XI, ch. XIII, 8; XII, ch. II, 10. O. Keller, *Die Antike Tierwelt*, Vol. I, p. 225. Leipzig, 1909.

⁸⁴ A. G. Keller. Homeric Society, pp. 20-21, 33-37. N. Y. 1902.

⁸⁵ E. Buchholz, *Homerischen Realien*, vol. II, pp. 137-139. Leipzig, 1881.

⁸⁶ Vergil, *Aen.* VI, 674.

⁸⁷ *Iliad*, XV, 630-632.

⁸⁸ *Iliad*, II, 775.

⁸⁹ *Iliad*, XX, 221-222.

⁹⁰ Strabo, XIII, ch. I, 31, 36.

where this stream watered another meadow for the horse-taming Trojans.⁹¹ Farther south on the Aegean coast of Asia Minor, Homer observes "the wild geese or cranes or long-necked swans on the Asian meadow about the streams of Cayster,"⁹² where the river meanders through its alluvial plain to the sea.

The Troad and Phrygia Minor to the north, located between the Aegean and the Propontis or Marmora, receive rain-bearing winds from both seas. Especially the Pontic clouds condense on the successive tiers of east-and-west ranges, which increase in altitude towards the high crests of Mount Ida and the Mysian Olympus in the south. A rainfall of 32 inches (800 mm.), fertile valley floors of alluvium, rich moist meadows, and swampy lakes formed by the streams dammed by the coastal hill ranges, combined to make admirable conditions for tillage and stock-raising here in ancient times as today.⁹³ Therefore Abydos and Percote on the Hellespontine shore had "pastures for swift mares" and for oxen;⁹⁴ and the Adrasteia plain, through which the Granikos flowed, was a natural pastureland praised by Homer. Nearby "many-fountained Ida,"⁹⁵ exposing a long flank to the Pontic winds and rains was wont to echo with "the lowing of herds and the bleating of sheep."⁹⁶ Farther east Asia Minor presents a continuous front of high forested mountains to the Pontic winds; but wherever a longitudinal trough like the Salon valley of northern Bithynia provided a level surface, or a river like the Iris or Phasis succeeded in building a small delta on this steep coast, where nature's irrigation overcame the summer drought,⁹⁷ there we hear of highly valued pastures for cattle and horses, of cows famous for their milk,⁹⁸ and of choice cheeses which entered the markets of the Mediterranean world.⁹⁹ So rare were good pastures that they were never overlooked by the ancients, even though small in area. Significant is the fact that these ancient meadows are districts of cattle production today. Such is the ancient Salon or modern Boli valley of Bithynia.¹⁰⁰

⁹¹ Iliad, III, 250; XIV, 443.

⁹² Iliad, II, 460-461.

⁹³ Banse, *Die Turkei*, pp. 65-71.

⁹⁴ Iliad, II, 819; XV, 546.

⁹⁵ Iliad, XIV, 283.

⁹⁶ Sophocles, Niobe, quoted in Strabo, XII, ch. VIII, 21. Iliad, II, 749; V. 315; XXI, 448.

⁹⁷ Strabo, XII, ch. III, 15.

⁹⁸ Aristotle, *De Animalibus*, III, ch. XXI, 17.

⁹⁹ Strabo, XII, ch. V, 7. Pliny, XI, ch. 97.

¹⁰⁰ Banse, *Die Turkei*, p. 80.

HORSES IN THRACE.—Thrace was famous for its horses from Homeric times. The great quarternary plain of eastern Thrace was probably too dry in the summer, as it is today, to provide proper pasturage for horses. However, the long southern littoral from Lake Stentoris and the mouth of the Hebrus River (Maritza) west to the Axios (Vardar) was a succession of lakes, lagoons, marshes, and brackish pools, and of alluvial lowlands, flooded at intervals by the mountain streams draining from the lofty Rhodope highlands,¹⁰¹ and possessing every geographical feature for wet pastures. Diomedes, whose horses figured in the Trojan War and in the adventures of Hercules, ruled over the plain of Lake Bistonis with its city of Abdera, a region lying so low that Hercules was able to flood it by cutting a canal to the sea.¹⁰² The horses of the Thracian Rheseus were the finest, swiftest and whitest ever seen by Trojan or Greek. Two herds of chestnut horses formed part of the dowry of a daughter of King Cotys of Thrace in the 4th century B. C.¹⁰³ Cavalry constituted an important feature of the Thracian army from the time of the Peloponnesian War down to that of the Roman Caesars, and made it a valuable ally in war.¹⁰⁴ In Strabo's time the Thracian cavalry numbered 15,000, and the infantry 20,000, an unusual proportion.¹⁰⁵ Thracian horses were early imported into Italy and Sicily, and the peculiar markings of the Thracian breed were well known.¹⁰⁶ White horses were brought to Rome for sacrifices and also to carry the victorious consuls in the public triumphs. After the Macedonian conquest, Thracian cavalry was incorporated in the mounted forces of Philip the Great, which were already strong. For Macedon has ample meadows in the broad alluvial plain of the Axios River, and excellent summer pastures in the northern mountains, whence came the Paeonian cavalry. Moreover, Philip imported 20,000 fine mares (*Nobilium equarum*) from the lower Danube Plains to improve his stock and probably introduced Thracian, Thessalian and Epirote strains for the same purpose.¹⁰⁷

STOCK-RAISING IN GREECE.—In Greece proper only a few localities afforded suitable pastures for horses and cattle, especially in the more arid eastern part of the peninsula, which was cut off by mountain ranges from the rain-bearing winds from the west. In this populous and progressive eastern part, cattle or their products were imported from the

¹⁰¹ Herodotus, VII, 58, 109, 124.

¹⁰² Iliad, XIV, 225-227. Strabo, Fragment, 44, 47, 48.

¹⁰³ Athenaeus, Bk. IV, 7.

¹⁰⁴ Mommsen, *Provinces of the Roman Empire*, vol. I, p. 226. N. Y. 1887.

¹⁰⁵ Strabo, Fragment, 48.

¹⁰⁶ Vergil, *Aen.* V, 565.

¹⁰⁷ O. Keller, *Die Antike Tierwelt*, Vol. I, p. 227. Leipzig, 1909.

steppes of far away Scythia, Africa and from Macedonia¹⁰⁸ to supply the local demand. The best and largest pastures were to be found in the broad lacustrine basin of Thessaly, which was alternately flooded and drained by the Peneus River system. This region repeatedly furnished cavalry for Athens from the days of Pisistratus,¹⁰⁹ and provided horsemen for Alexander's army in his conquest of Asia. In all Greek wars its alliance was sought because of its mounted troops. The Thessalian horse was a superior animal, the product of good feeding, of broad artificial selection made possible by large numbers, and of free movement over wide plains, whether he was grazing, training for races, or practising in cavalry manoeuvres. Therefore Sophocles makes Orestes enter the Pythian Games with a span of Thessalian steeds. A Thessalian stud farm at Pharsalus, on the southern margin of the lacustrine basin, bred Alexander's famous horse Bucephalus.¹¹⁰ Aristotle in his *Politics* attributed the strong oligarchy which always ruled Thessaly to the adaptation of the country to horse-breeding, and the consequent concentration of cavalry forces in the hands of rich landowners. Homer praises "the oxen, horses and harvests of deep-soiled Phthia"¹¹¹ whose pastures bred the steeds of Achilles. This region comprised the shelving coast of the Pegasae Gulf and the alluvial valley of the Sperchius River, whose broad flats along the sea, always soaked and always growing by annual accretions of silt farther out into the Malic Gulf, must have furnished excellent wet meadows for the ancient warlord as for the peasant of today. Across these fens of the Sperchius the modern carriage road runs for five miles on the top of a dyke, pierced at intervals to let the distributaries flow out to the sea, whose low shoreline is faintly visible several miles to the east. The growth of the half-fluid soil went on in Homeric times as today and provided perennial meadows. The scene embossed on the shield of Achilles may have been taken from his home country. It depicted a herd of kine: "lowing they hurried from the byre to pasture beside a murmuring river, beside the waving reeds," invariable marks of swamp vegetation.¹¹²

HORSES IN HELLAS.—Aside from the Sperchius valley plain, which was the borderland of ancient Thessaly, Hellas proper could show only one region of excellent pasturage, and that was the moist lacustrine basin of Boeotia. Its early preëminence in horse breeding was based upon the rich pastures of "grassy Haliartus" on the reed-grown

¹⁰⁸ Herodotus, VII, 126. IV, 1-12. Polybius, IV, 38.

¹⁰⁹ Herodotus, V, 63. Thucydides, I, 102, 107; II, 22.

¹¹⁰ Arrian, *Anabasis*, V, 19, 5.

¹¹¹ *Iliad*, I, 154.

¹¹² *Iliad*, XVIII, 573-576.

margin of Lake Copais,¹¹³ and "Graia and Mycalessos with their wide meadows" in the valley of the River Asopus.¹¹⁴ Therefore Boeotia was chief "of all the lands far-famed for goodly steeds."¹¹⁵ This reputation, voiced by Sophocles, is repeated three centuries later by Dicaearchus.¹¹⁶ And Thucydides states that only Boeotia, Phocis and Locris furnished the cavalry of the Spartan allied forces during the Peloponnesian War.¹¹⁷ Phocis comprised the northern portion of the fairly broad valley of the Cephissus River, which continues southward as part of the Boeotian plain. It is rather a significant coincidence that the author, in a recent motor trip through Greece, met groups of horses only in Boeotia, the Cephissus valley of Phocis, and in Thessaly. The cavalry of Locris must have depended upon the small but fertile coastal plain of Opous along the Euboean Sound. The location of these cavalry states was ominous for Greece. At the battle of Plataea, as described by Herodotus, the allied Hellenic states had no mounted troops, because the invading Persians conquered or conciliated all the "horse" country to the north through which they marched.¹¹⁸ Attica, as we have seen, had no pasture land and very slowly developed a limited force of cavalry. The conquest of the lower Asopus plain from Boeotia and the acquisition of the island of Euboea with its good pastures, once famous for their horses and cattle,¹¹⁹ may have helped Athens maintain its thousand horsemen.

STOCK-RAISING IN THE PELOPONNESUS.—The Peloponnesus contained little territory suited to cavalry movements. This fact partly explains the scarcity of mounted troops in the peninsula, whose wars were largely border conflicts along the high mountain boundaries of the several states. Such were Sparta's wars with Messenia, Argolis and Arcadia. "Argos pasture land of horses," which comprised the small silted plain at the head of the Argolic Gulf, and the valleys of Homeric Sparta, which included both Laconia and Messenia, were famous for their meadows and their equine stock.¹²⁰ The boy Telemachus, coming from the rugged isle of Ithaca, admired Sparta's "open plains where clover is abundant, marsh-grass and wheat and corn and

¹¹³ Theophrastus, *Historia Plantarum*, IV, ch. X, 7. Iliad, II, 503. Strabo, IX, ch. II, 18.

¹¹⁴ Iliad, IV, 499. Strabo, IX, ch. II, 10-11.

¹¹⁵ Sophocles, *Edipus Colonus*, 668.

¹¹⁶ Quoted in J. G. Frazer, *Pausanias*, Introduction, p. XLV. London, 1898.

¹¹⁷ Thucydides, II, 9.

¹¹⁸ Herodotus, IX, 19-29.

¹¹⁹ Ibid. V, 77.

¹²⁰ Iliad, III, 74; IV, 530.

white-eared barley,"¹²¹ and he received from King Menelaus a pair of horses as a gift. But the valley plain of the Eurotas River contains only about 40 square miles of level land ["lying low amid the rifted hills;" it is shut off from the sea by a broad limestone ridge through which the little stream has cut its course to the Laconic Gulf. This plain had to suffice for both plough and pasture land for the Spartans of the historical period, till they conquered Messenia about 600 B. C.

It is easy to see the growing pressure of population upon the limits of subsistence in this secluded valley, the consequent substitution of hoplites or spearmen for cavalry as the main force of the Spartan army,¹²² and the conquest of Messenia as a piece of necessary territorial expansion, all at about the same time. In this connection consider the further fact that the Eurotas valley, lying far south and in the rain-shadow of the lofty Taygetus Mountains, receives only 20 inches of rain (500 mm.) and endures four months of summer drought. Significant is the fact that the first Messenian war arose from a border quarrel, evidently about some pastures on a high, water-soaked moor (a common Alpine phenomenon), located west of the Taygetus crest, where the Spartans had set up a shrine or temple to Artemis Limnates or Artemis of the Marshes,¹²³ possibly to sanction their encroachment on Messenian territory. This Artemis was a goddess of fertility, worshipped in swampy or moist alluvial spots which were conspicuous by their succulent green herbage in the dry brown landscapes of the Greek summer.¹²⁴

Messenia's extensive alluvial plains and her location on the windward side of the Taygetus range insured for her fairly abundant moist meadows. Here were "grassy Hira, divine Pharae, and Antheia deep in meads" all located on the deltaic flats along the Messenian Gulf.¹²⁵ The modern Kalamata, on the site of ancient Pharae, gets an annual rainfall of 39 inches (980 mm.),¹²⁶ and occupies a plain irrigated by the Nedon River, draining from the Gomo peak (4,165 feet or 1,277 meters) of the Taygetus range. Therefore ancient Messenia was famous for its cattle and horses.¹²⁷ We even hear of its selling a shipload of horses to Egypt in the third century B. C.¹²⁸

Messenia shared the advantage of an ampler rainfall, coupled however with a long summer drought, with all western Peloponnesus and

¹²¹ *Odyssey*, IV, 602-604.

¹²² J. B. Bury, *History of Greece*, p. 129. London, 1909.

¹²³ Tacitus, *Annals*, IV, 43. Pausanias, III, ch. VII, 4; IV, ch. XXXI, 3.

¹²⁴ M. P. Nilsson, *Griechischen Feste*, pp. 214-216. Leipzig, 1906.

¹²⁵ *Iliad*, IV, 291. Strabo, VIII, ch. IV, 1, 5.

¹²⁶ A. Philippson, *Europa*, p. 284. Leipzig, 1906.

¹²⁷ Strabo, VIII, ch. IV, 6.

¹²⁸ Polybius, V, 37.

Hellas north to the Gulf of Ambracia (Arta) and the borders of Epirus, where summer showers begin. The broad Tertiary plain of Elis, watered by the Alpheus and Peneus rivers, and dotted with lagoons along its coastal belt, contained the best lowland pastures of the Peloponnesus.¹²⁹ Here grazed the cattle from the stables of King Augeus and the famous horses of Nestor of Pylus,¹³⁰ the king who in a cattle raid on the neighboring city of Elis drove off 50 herds of kine, 50 flocks of sheep, 50 flocks of goats, and 150 mares with their foals.¹³¹ There followed a punitive expedition by mounted Eleians and a battle in which horses and chariots were part of the booty,¹³² fought out on the level plain of the Alpheus. When Philip V. of Macedon invaded the Peloponnesus in 218 B. C. and violated the sanctity of sacred Elis, he secured an immense amount of cattle.¹³³ Today, the little town of Gastouni near the mouth of the Peneus, only six miles from the ancient capital city of Elis, is the chief cattle market of the Peloponnesus. Thus closely does the prosaic present link itself with the heroic past. Thus persistently operate the geographic factors in history.

The highland core of the Peloponnesus, the plateau of Arcadia, contained several small lake basins with katavothra drains, subject to flooding after winter rains and spring thaw of the snow on the surrounding mountains. These afforded fine meadows, as the central pool contracted with the continued drought of summer, leaving a girdle of verdure behind. The lake plain of Orchomenus was mostly mere,¹³⁴ owing to the drainage from the surrounding heights; on the plain of Pheneus, according to tradition, Odysseus kept his mares on pasture.¹³⁵ All Arcadia became famous for its sheep, asses, horses and cattle.¹³⁶ Rugged mountain relief excluded horses and cattle from the small islands of Greece, but admitted sheep, goats and swine, where the forest yielded mast. Telemachus describes his native Ithaca as having "no open runs, no meadows, a land for goats and pleasanter than grazing country. Not one of the islands is a place to drive a horse, none has good meadows of all that rest upon the sea."¹³⁷ Therefore Odysseus pastured his goats and some of his swine on the home island,

¹²⁹ Theocritus, *Idyls*, XXV.

¹³⁰ *Iliad*, XXIII, 202-203.

¹³¹ *Iliad*, XI, 671-680.

¹³² *Iliad*, XI, 707-723, 739-747.

¹³³ Polybius, IV, 75.

¹³⁴ Pausanias, VIII, ch. XIV, 1-4.

¹³⁵ *Ibid.* VIII, ch. XIV, 5-6.

¹³⁶ Varro, II, ch. I, 14; ch. IV, 12; ch. VI, 2; ch. VIII, 3.

¹³⁷ *Odyssey*, IV 604-608; XIII, 241-246.

but sent his twelve herds of cattle and his flocks of sheep to pasture on the broad alluvial lowlands of Acarnania and Aetolia on the opposite mainland.¹³⁸ An Ithacan nobleman kept a stud-farm of twelve mares across the strait in Elis, where he bred mules.¹³⁹

STOCK-RAISING IN EPIRUS.—Farther north on this western front of Greece lay Epirus, with high lake plains tucked away between its wooded mountain slopes, receiving 40 inches of rain (1,000 mm.) or more annually and getting thunder storms till mid-summer. Though located on the sunset side of Greece, far from the morning foci of Hellenic culture, the fame of its pastures and herds penetrated eastward, because it contained the Pelasgian sanctuary of Dodona. So Hesiod sang: "There is a land Ellopiea with much glebe and rich meadows, abounding in flocks and shambling kine. There dwell men who have many sheep and many oxen. . . . And there upon its border is built a city Dodona."¹⁴⁰ The sanctuary lay on the southern margin of the katavothra pool, Lake Ioanina, which in ancient as in modern times was bordered by wet meadows, while the whole valley of Ioanina, 20 by 7 miles in extent, was one immense plain of pasture,¹⁴¹ free from the encroachments of a too dense population. The cattle of Epirus were the finest of Greece, better than those of Italy, and therefore they were exported to improve the strains on Roman farms.¹⁴² Aristotle states that Epirus raised very large cows which gave one and one-half amphora or ten gallons of milk daily; and that these cows, which required much pasture, could be changed to fresh grazing every hour, so abundant and excellent was the meadow land.¹⁴³ The oxen too were very large. Epirus pastured also the King's herds of huge Pyrrhic cattle which could not live, or more probably deteriorated, when removed to other countries.¹⁴⁴ Today the pasture lands of Epirus, still excellent and much extended by deforestation, support a considerable cattle and horse-raising industry.¹⁴⁵

SHEEP AND GOATS IN GREECE.—Goats and sheep were regular adjuncts of ancient Greek farms like the homestead of Odysseus; but in summer they went to "the high meadows of the pasturing flocks."¹⁴⁶

¹³⁸ *Odyssey*, XIV, 13, 99–103. Strabo, VIII, ch. VIII, 1.

¹³⁹ *Odyssey*, IV, 634–635.

¹⁴⁰ Hesiod, *Catalogue of Women and Eoiae*, 97. Loeb Lib., London, 1914.

¹⁴¹ W. Leake, *Northern Greece*, vol. IV, pp. 131–135, 168–173, 184–200. London, 1835.

¹⁴² Varro, II, ch. V, 10. Strabo, VII, ch. VII, 5, 12.

¹⁴³ Aristotle, *De Animalibus*, III, ch. XXI.

¹⁴⁴ Aristotle, *De Animalibus*, VIII, 7.

¹⁴⁵ Philippson, *Thessalien und Epirus*, p. 279. Berlin,

¹⁴⁶ Sophocles, *Edipus Rex*, 1103.

The shepherd in Sophocles' *Edipus Rex*, when asked where he dwelt, replied: "Now t'was Kithaeron, now on neighboring heights." And again: "He needs must know when on Kithaeron's fields, he with a double flock and I with one, I was his neighbor during three half-years, from spring until Arcturus rose; and I in winter to my own fold drove down my flocks, and he to those of Laios" (in Thebes).¹⁴⁷ These mountain pastures were inter-state boundary zones, where shepherds and flocks from the two sides mingled every season. Here it was easy to spirit away a child across the border to an asylum in some shepherd's cot beyond, as was done with the infant Edipus, rather than incur the moral responsibility of exposing him to the wolves.

The breeds of sheep and goats were selected for the improvement of the wool and hair. Cattle rearing too was conducted in Greece on scientific principles. Choice animals were reserved for breeding purposes, and the strain was improved by the importation of superior foreign kinds.¹⁴⁸ Aristotle states that the oxen and sheep of Greece were smaller than those of Egypt, though he seems to make an exception of the Epirote cattle.¹⁴⁹ In this connection, the fact is significant that Xerxes found the Thessalian horses, which were the best of all Greece, distinctly inferior to the Persian animals.¹⁵⁰ This may mean that horse-raising in Greece suffered from small numbers and excessive in-breeding, which frequently results in dwarfing; while the stud-farms of Babylonia comprised enormous numbers of animals. The cob type of horse depicted in the frieze of the Parthenon may be the far-off artistic effect of a geographic cause.

MOUNTAIN PASTURES IN ITALY.—The location of Italy farther west and north than the lands of the Eastern Mediterranean Basin insured the peninsula a heavier rainfall and therefore better grazing.¹⁵¹ Its relatively extensive coastal lowlands and river plains afforded larger areas for wet meadows than were found farther east, except in Egypt. The Alps, with their frequent summer showers and extensive growths of deciduous trees, furnished excellent highland pastures in the hot season. The Apennines, owing to their ample precipitation (35 to 50 inches), their long western slope facing the rain-bearing winds, and the top dressing of volcanic soil covering much of their valley floors, yielded fair or even excellent grazing for horses and cattle

¹⁴⁷ Ibid, 1127, 1135-1139.

¹⁴⁸ Blümner, *Home Life of the Ancient Greeks*, p. 497. London, 1895.

¹⁴⁹ Aristotle, *De Animalibus*, VIII, ch. XXVII, 5.

¹⁵⁰ Herodotus, VII, 196.

¹⁵¹ Strabo, III, ch. V, 1.

during the summer droughts, and thus supplemented the winter pastures on the plains. Geographic conditions in Italy therefore favored the development in ancient times of organized pastoral husbandry on a big scale, many phases of which have persisted to the present, despite the deterioration of the Apennine pastures in consequence of forest denudation. Before the Punic Wars, as now, flocks and herds were driven every spring from the plains of Apulia to the public grazing grounds in the mountains of Samnium,¹⁵² and in autumn they descended again to the lowlands, to feed upon the meadows, reviving with the fall rains, or upon the stubble of the grain fields. In these seasonal migrations through the centuries they beat out broad, grassy tracks, the ancient *calles publicae*, which survive in the modern *tratturi* used today by the nomad herders.

During the last two centuries of the Roman Republic, stock-raising on big hill or mountain estates (*saltus*), varying in size from 800 to many thousand *jugera* (500 acres up) began greatly to overshadow tillage.¹⁵³ The term *saltus* came to be applied indifferently to a high-land pasture and a mountain range or *massif*,¹⁵⁴ like the *Saltus Ciminus* of Etruria and the *Saltus Vescinus* on the border between Latium and Campania. The animals raised were chiefly sheep, goats, and swine; in a less degree cattle, horses, mules, and asses, for whom suitable pasturage was in general less abundant.¹⁵⁵ However, the brushwood and leafage of the hill pastures, where groves of deciduous trees abounded, made a welcome and wholesome change to horses and cattle from the grass of the lowlands, and constituted one advantage of the transfer from the winter grazing land.¹⁵⁶ Another factor in the improvement may have been the escape from the mosquitoes and flies of the plains.

Cattle, horses, and mules of inferior breeds were raised in the Ligurian Apennines, where a rainfall of 50 inches (1,250 mm.) insured unfailing pastures, and were sold in Genoa whence they were exported to Rome.¹⁵⁷ In the extreme south of Italy, the high plateau-like range of Sila Mountain stretching through the length of Bruttium rises high enough (Sila Forest 6,330 feet and Aspromonte 6,420 feet) to get a rainfall rivalling that of the Alpine piedmont (43.3 inches

¹⁵² Varro, II, ch. I, 16; ch. II, 9.

¹⁵³ Mommsen, *History of Rome*, vol. III, p. 74. N. Y. 1905.

¹⁵⁴ Catullus, XXXIV, 11.

¹⁵⁵ E. Speck, *Handelsgeschichte des Altertums*, vol. II, part II, p. 240. Leipzig, 1901.

¹⁵⁶ Varro, II, ch. II, 10.

¹⁵⁷ Strabo, IV, ch. VI, 2.

at Cosenza).¹⁵⁸ It was therefore covered with forests and pastures, frequented by flocks and herds. "On mighty Sila feeds the lovely heifer," sang Vergil.¹⁵⁹ The cheese of the region was famous, "recalling by its taste the fragrant herbs on which the cattle browsed."¹⁶⁰ On the eastern slope of Sila Forest, in the valley of the Neaethus (modern Neto), Theocritus staged the meeting of neatherd and rustic in his fourth idyl. Today thousands of horses, cattle and sheep crop the summer herbage of the Sila pastures,¹⁶¹ tended by rougher herdsmen than those who piped to the Greek Theocritus. Sicily presented a happy combination of upland pastures and moist, lowland meadows,¹⁶² which made it a home of horse-breeders and cattlemen from early times. Horses and mules from Syracuse, Aetna, Acragas and Kamarina took prizes in the Sacred Games of Greece from 494 B. C.,¹⁶³ and cavalry forces were always at hand for the Tyrants of Syracuse.¹⁶⁴ The Roman conquest saw the whole interior of Sicily converted into vast grazing estates. The official plunder of the Proconsul Verres comprised "herds of the noblest mares."¹⁶⁵

THE WET PASTURES OF ITALY.—Italy had numerous wet pastures unreclaimed or unreclaimable for tillage, like the Fenland of England and the polders of Holland. The depressed area of northern Apulia, located between the Apennines and Monte Gargano, was a lake-strewn lowland of immature drainage underlain by hard limestone, which was impenetrable to the roots of trees.¹⁶⁶ Useless for orchard or vineyards, and flooded by the Apennine torrents from October to June, it served well for pasture land.¹⁶⁷ Greek legend associated the region with Diomedes, the great horse-fancier, and told of his attempts to control the inundations by cutting a canal through the lowland to the sea. The founding here of Argos Hippium or "horse-breeding Argos,"¹⁶⁸ which survived as the Roman town of Arpi, coupled with the legend of Diomedes, points to marsh pastures, which Greek colonists

¹⁵⁸ W. Deecke, Italy, pp. 82, 428-431. London, 1904.

¹⁵⁹ Vergil, Georgics, III, 219.

¹⁶⁰ Cassiodori *Variae*, II, 9-13.

¹⁶¹ Gael-Fells, *Unter-Italien*, p. 721.

¹⁶² Theocritus, Idyls, *passim*. Strabo, VI, ch. II, 3.

¹⁶³ Pindar, Odes, Olym. I, III-VI. Pyth, I, II, III, VI. Diodorus Siculus, VIII, 82.

¹⁶⁴ Thucydides, VI, 20.

¹⁶⁵ Strabo, VI, ch. II, 6, 7. Cicero, Verres, II, 7, 20.

¹⁶⁶ Deecke, Italy, p. 401. London, 1904.

¹⁶⁷ Columella, VI, ch. XXVII, 2. Pliny, VIII, 154.

¹⁶⁸ Strabo, VI, ch. III, 9.

exploited and drained by ditches during the winter floods. Here arose the Apulian breed of horses,¹⁶⁹ which was famous among the Romans.

Similar geographic causes and economic effects existed in the extensive marshes about the head of the Adriatic, which in summer afforded wide stretches of wet meadows. There the flood season was protracted long after the winter rains, owing to the slow melting of the Alpine snows; and there in a region of marshes, lagoons, braided streams, meandering rivers and deltaic distributaries, lived the ancient Veneti, from remote times famous for their horses. They let their equine herds pasture at large on the wet meadows, but branded each animal with its owner's name. Certain fine breeds of horses became established, and acquired a reputation even in Greece. The grazing was so excellent, that Dionysius, Tyrant of Syracuse, (d. 367 B. C.) kept his stud of race horses on these Venetian plains.¹⁷⁰ Similar conditions obtained over much of the level, well watered Po valley, where abundant irrigating streams, high water table, and occasional summer showers combined to keep the meadows green. There, on his father's Mantuan farm, Vergil knew the "wide pastures by the brimming river, where moss abounds and green herbage lines the banks;" and where brood mares and cows found the best grazing. There was the grass, the willow leaves, the marsh sedge and the standing grain which made the best fodder for growing oxen.¹⁷¹ Countless irrigation streams, fed by Alpine rivers, kept the lush grass green throughout the hot season, and maintained the herds of cattle and the famous cheese industry of antiquity, much as they do today.

Wet meadows on a smaller scale were found in many longitudinal valleys of the Apennines, where the drainage was imperfect. Horace, on his frequent journeys to his Sabine farm up in the Anio valley, must have often seen these "grassy meads with winding streams and willows of the marsh."¹⁷² He had one on his own estate which needed diking, because the winter or spring floods were sometimes excessive.¹⁷³ The Sabine country comprised also the Reate district with its excellent pastures, where Varro located his stud farm and where the famous Rosea breed of horses originated.¹⁷⁴ It lay in an old lake basin in the Sabine country, just where converging streams debouched upon the intermontane plain. Constant deposition of travertine, by the River Velinus, whose waters were impregnated with carbonate of lime, tended to dam the outflow, kept the valley floor too wet for tillage, and

¹⁶⁹ Varro, II, ch. VII, 1. Columella, VI, ch. XXVII, 2.

¹⁷⁰ Strabo, V, ch. I, 4, 5, 6.

¹⁷¹ Vergil, *Georgics*, III, 143-144, 175-176.

¹⁷² Horace, *Odes*, Bk. II, V, 1.

¹⁷³ Horace, *Epistles*, Bk. II, XIV, 29.

¹⁷⁴ Varro, II ch. VI, 1-2; ch. VII, 6; ch. VIII, 3.

finally flooded the Rosea pastures.¹⁷⁵ This necessitated a series of drainage canals, constructed through the centuries from 271 B. C., which reclaimed the Rosea plain for grazing.¹⁷⁶ In summer, the mules and asses of Reate were driven up into the neighboring mountains,¹⁷⁷ probably to release the Rosea meadows for hay crops. Similar valleys of immature or arrested drainage in Etruria and Umbria, like the lake-strewn course of the Clanis River and swampy course of the lower Arno in Etruria, must have provided the excellent meadows which, supplemented by the Apennine pastures, explain the good cattle and sheep, and the famous cheese of these districts.

IRRIGATED FODDER CROPS IN ITALY.—The out-pastures of the mountains and marshes were abundantly supplemented by hay, clover, alfalfa and other fodder crops, maintained by irrigation through the summer, for the winter keep of the stock, especially the horses and work animals. Meadows were located preferably in rich valley or plain land. The soil, whether light and loose or stiff and heavy, was carefully tilled and regularly manured, especially on hillside fields. Marshy land, if in meadow, was drained by ditches and then irrigated at will.¹⁷⁸ Pliny urged that rain water from public highways should be diverted to the meadows, evidently because it contained soluble manure from the droppings of passing animals. Hay and clover fields were mowed in early June, irrigated, mowed again in August, and usually again in September or October. At Interamna in Umbria the farmers got four crops of hay a year,¹⁷⁹ as might be expected from the location of the place on a flood-plain peninsula between two streams. Lucerne or alfalfa fields regularly yielded six crops.

Even with this careful provision for fodder, animals were most economically fed. Cato recommended that the green leaves of elm, poplar, fig and oak trees, so long as they were available, should be fed to cattle and sheep, if hay were scarce;¹⁸⁰ that the straw of all grains, also of beans, vetch and lupines should be stacked in the barn for fodder, and grape husks preserved in jars for the same purpose; that mast gathered in the forests be soaked in water and fed to the oxen.¹⁸¹ Chaff also, preferably that of millet or barley, was used as

¹⁷⁵ Deecke, *Italy*, p. 102. London, 1904.

¹⁷⁶ Mommsen, *History of Rome*, vol. II, p. 85. N. Y. 1905.

¹⁷⁷ Varro, II, ch. VIII, 5.

¹⁷⁸ Cato, *De Re Rustica*, VIII, XXVIII, LIII. Columella, II, ch. 2, 17, 18. Varro, I, 29.

¹⁷⁹ Pliny, VIII, ch. 28, 67. Varro, I, 31, 33.

¹⁸⁰ Cato, *De Re Rustica*, V, XXV. Pliny, VIII, 74.

¹⁸¹ Cato, *De Re Rustica*, XXX, LIV.

feed.¹⁸² Moreover the allowance of oxen for tillage land was small, only one yoke for every 80 or 100 jugera,¹⁸³ despite the numerous ploughings both of fallow and crop fields.

Cattle raising was an important branch of stock farming in Italy, because cows or oxen yielded various products (meat, milk, hides and horns) and served as the chief work animals. Horses and mules were extensively used as draft animals, more than in Greece and Asia Minor; because land travel was better developed in Italy, luxury had reached a higher point,¹⁸⁴ and the supply of animals was greater, owing to more abundant pasturage. Nevertheless, the effect of the summer drought in restricting the supply of horses remained apparent. From 200 to 50 B. C. the export of horses from Italy was forbidden by law. Certain Gallic envoys from Istria and the neighboring Alps in 170 B. C. received special permits to export ten horses each,¹⁸⁵—proof of the rigid control. The importance of the unfailing northern pastures for horse-raising is evidenced by a fact cited by Mommsen, namely, that in the Imperial Roman army the cavalry was Celtic, recruited pre-eminently from Trans-Alpine Gaul, with Gallic men, whose maneuvers and technical terms were Celtic.¹⁸⁶

SWINE IN ITALY.—Swine production, which in the ancient Mediterranean world depended chiefly on mast-yielding forests, flourished in Italy, because climatic conditions permitted beech, oak and chestnut groves in nearly all parts of the peninsula. Pigs were raised on every landed estate.¹⁸⁷ They were fed mainly on the mast of the home woodland or the mountain forests,¹⁸⁸ and then fattened on barley and other grains to give the meat various flavors.¹⁸⁹ Beechnut bacon was a commonplace in Rome. No other country slaughtered so many pigs, for sacrifices, family use and the army commissary, according to Polybius. The chief supplies in his time (150 B. C.) came from the Po valley, whose northern location and encircling mountains ensured the late spring and early summer rains necessary to maintain abundant mast forests.¹⁹⁰ With the expansion of Roman power into Farther Gaul and the growing demand of the populace for imported food supplies,

¹⁸² Pliny, XVIII, 72, 74.

¹⁸³ Cato, R. R. X. Varro, I, ch. XIX, 1.

¹⁸⁴ Blümner, *Römische Privataltertümer*, pp. 460–465. Munich, 1911.

¹⁸⁵ E. Speck, *Handelsgeschichte des Altertums*, vol. III, part II, p. 284. Leipzig, 1901. Livy, XLIII, 5.

¹⁸⁶ Mommsen, *Provinces of the Roman Empire*, vol. I, p. 116. N. Y. 1887.

¹⁸⁷ Cicero, *De Senectute*, XVI, 56. Columella, XVII, 9.

¹⁸⁸ Vergil, *Georgic*, II, 72, 520.

¹⁸⁹ Varro, II, ch. IV, 3. Pliny, VIII, 209.

¹⁹⁰ Varro, II, ch. IV, 10–11. Polybius, II, 15. Strabo, V, ch. I, 12.

this well forested northern province began shipping salt pork not only to Rome but to other parts of Italy. That from the Sequanian country at the head of the Saône valley had a great reputation.¹⁹¹ The wooded slopes of the Pyrenees and rainy Cantabrian mountains of northern Spain also supported herds of swine, which furnished the basis for a lucrative native export trade in hams.¹⁹²

SHEEP IN ITALY.—Sheep-raising was widely distributed in ancient Italy, and it was semi-nomadic in its character, the flocks vibrating between the plains in winter and the Alps and Apennines in summer. The sheep producing the choicest wool, both as to softness, fineness and natural colors (white, black and tan), grazed on the leeward slopes of the Alps and Apennines, where the pastures were relatively dry. They were found in the south in ancient Apulia about Luceria and Canusium, in Calabria about Tarentum and Brundisium, in eastern Lucania and the nearby valleys of the Sybaris and Crathis.¹⁹³ Their superiority in this district may be attributed in part to the fact that they belonged to the fine Greek breeds imported by the original colonists of Magna Graecia.¹⁹⁴ In northern Italy also the finest fleeces came from the rain-shadow sides of the Apennines and Alps; from the *Campi Macri* in the northern Apennines between Parma and Mutina, whose fine toga wool ranked with that of Tarentum;¹⁹⁵ from western Liguria at the eastern foot of the Alps about Pollentia; and from the Venetian plain about Altinum, whose product ranked next to that of Apulia and Parma.¹⁹⁶ All the Po valley pastures produced coarse wool and goats' hair suitable for weaving rough cloth for mantles and slaves' dress. The finer yields were evidently a late development,¹⁹⁷ synchronous with the advance of civilization and movement of population into this colonial frontier district of Roman Italy. Significantly enough, all these regions of fine wool production have maintained their leadership into the present.¹⁹⁸

THE IMPROVEMENT OF BREEDS.—At a time when the rainy lands of middle and northern Europe knew only uncontrolled stock-raising on the open range, Italy, like Greece, secured the largest financial

¹⁹¹ Strabo, IV, ch. I, 2; ch. III, 2; ch. IV, 3.

¹⁹² Strabo, III, ch. IV, 11.

¹⁹³ Horace, *Carmina*, Bk. III, XV, 13. Columella, VII, ch. II, 3; ch. IV, 1. Pliny, VIII, 190.

¹⁹⁴ Blümner, *Römische Privataltertumer*, p. 237. Munich, 1911.

¹⁹⁵ Columella, VII, ch. II, 3. Strabo, V, 218.

¹⁹⁶ Martial, XIV, 155.

¹⁹⁷ Columella, VII, ch. II, 3.

¹⁹⁸ L. W. Lyde, *Continent of Europe*, p. 94. London, 1913.

returns from its relatively limited pastures by improving its stock through artificial selection.¹⁹⁹ It laid great emphasis upon the choice of the best strains for breeding purposes. Horned cattle were imported from the Po valley and Epirus to improve the local breeds,²⁰⁰ especially large cows from the Pyrrhic herds, which had a great reputation in Italy.²⁰¹ The Italian cattle, which were bred primarily for work animals, were strong but gave little milk. Hence it became usual to import good milk cows from the Alpine regions.²⁰² Significantly enough, the same thing is done today on a big scale to exploit the wet meadows along the Po River, which are devoted to dairy cattle. Swiss cows are imported since they yield more milk when fed on these irrigated pastures for ten months than do the native Italian kine,—700 as opposed to 550 gallons. This large milk production explains the modern trade in Parmesan, Gorgonzola and Stracchino cheese which emanates from this region.²⁰³ In ancient times the Apennines of Umbria, Etruria and Liguria were the chief districts of cheese production,²⁰⁴ but the Alpine cheese of Narbonensian Gaul was the best, according to Martial.²⁰⁵

But the improvement of stock was not restricted to cattle. Fine mares of racing blood were imported from Thrace, Thessaly and Epirus,²⁰⁶ asses for breeding purposes from Arcadia,²⁰⁷ fine sheep from Attica and other parts of Greece,²⁰⁸ and rams for covering from the Guadalquivir valley of Spain.

Narbonensian Gaul formed a connecting link geographically and economically between Alpine Italy and Pyrenean Spain, owing to location, relief and climate. The valley plain and deltaic flats of the Rhone furnished moist pastures²⁰⁹ till July, just as they do today,²¹⁰ while the neighboring Alps and Cevennes Plateau furnished summer grazing. The abundance of cattle about Massilia was reflected in the low price paid for sacrificial oxen and young bullocks in the fourth century B. C. at the local Carthaginian temple, whose tariff of charges

¹⁹⁹ Vergil, *Georgic*, III, 156-161.

²⁰⁰ Varro, II, ch. V, 9-10.

²⁰¹ Pliny, VIII, 176.

²⁰² Columella, VI, ch. XXIV, 5. Pliny, VIII, 179.

²⁰³ G. C. Chisolm, *Commercial Geography*, p. 337. London, 1904.

²⁰⁴ Pliny, XI, 97.

²⁰⁵ Martial, XIII, 30, 31.

²⁰⁶ Vergil, *Georgic*, I, 59; II, 90.

²⁰⁷ Varro, II, ch. VIII, 3. Columella, VII, 1.

²⁰⁸ Varro, II, ch. II, 18. Columella, IV, 1.

²⁰⁹ Strabo, IV, ch. I, 7.

²¹⁰ E. Reclus, *Europe*, vol. II, pp. 99-102. N. Y. 1883. Also personal observation in 1922.

has been preserved;²¹¹ and it explains the ancient cheese export from Nemausus (Nîmes) and the district of the Gabali,²¹² famous for its cheese today.

STOCK-RAISING IN SPAIN.—In the rainy mountains of northern Spain, swine raising and the pork-packing industry were supplemented in the rugged provinces of Asturia and Gallacia by the breeding of sumpter mules, which answered the local need of transportation and were also exported to Rome.²¹³ On the steppes of the semi-arid Iberian plateau, large herds of wild horses pastured at large. They were fine swift animals, and explain the superiority of the native Iberian cavalry.²¹⁴ Hannibal had large numbers of African horses in Spain in 219 B. C., and he invaded Italy with 12,000 cavalry, chiefly Numidian but partly Spanish. In time, the Spanish breeds were greatly improved, because Spanish race horses competed in the Roman Circus with Cappadocian, Parthian and Armenian steeds in the first century of the Empire. Martial praises the horse racing at Bilbilis, on the northeastern rim of the Meseta. The economy of the highland tribes was primitive, based chiefly on a half-migratory agriculture and goat-herding, which was suited to their dry grass lands. Cattle-raising as an adjunct of sedentary tillage meets us only in Baetica in the tide-water plains of southwestern Spain, where Phœnician colonists early established themselves. There, in a region of scant rainfall (12 to 15 inches), the belt of littoral between the multiple mouths of the Guadalquivir and the Guadiana afforded natural meadows, which were watered both by meandering distributaries and flood tides. Those near Cadiz seem to have been communal pastures, probably owned by the city. The cattle grazing there were fat and yielded rich milk, but they were occasionally overwhelmed by the incoming tides.²¹⁵ The dry pastures of the Guadalquivir valley supported excellent sheep, whose wool was famous in the Roman world for its softness and color, especially the reddish-tan wool of the Corduba (Cordova) district.²¹⁶ The folded mountain ranges which enclose this valley on the south received enough rain for extensive forests of oak and other trees. These apparently sup-

²¹¹ A. Boeckh, *Die Staatshaushaltung der Athener*, vol. I, p. 95.

²¹² Pliny, XI, 97.

²¹³ E. Speck, *Handelsgeschichte des Altertums*, vol. III, part II, p. 283. Leipzig, 1901.

²¹⁴ Strabo, III, ch. IV, 15.

²¹⁵ Strabo, II, ch. II, 4, 5, 6; ch. V, 4.

²¹⁶ Blümner, *Römische Privataltertümer*, p. 240. Munich, 1911.

ported herds of swine, for Strabo tells us that Mellaria (modern Tarifa) produced salted provisions and exported them to Tingis (Tangier) in Mauretania.²¹⁷ These salted provisions undoubtedly comprised pork products, though they may have included also salt fish.²¹⁸ On the north-west side of the Iberian Peninsula, where exposure to the Atlantic winds insured unfailing rains, there was ample pasturage all year round, both in the plains of the Tagus and Duoro and on the neighboring highlands. This is indicated by the abundance and cheapness of oxen, calves, pigs and sheep in ancient Lusitania (Portugal),²¹⁹ where the grazing conditions resembled those of northern Italy.

STOCK-RAISING IN MEDITERRANEAN AFRICA.—North Africa reproduces the climatic conditions of interior Spain and the Guadalquivir valley, with their attendant effects upon stock-raising. In the territory of ancient Carthage, cattle and horses were associated with tillage in the irrigable plains near the coast. There in the moist alluvial valley of the Bagradas River (Majerda River) the invading army of the Sicilian Agathocles (4th Century B. C.) saw cows, oxen and sheep grazing in the irrigated meadows, while "in the near-by marshes there were vast numbers of brood-mares."²²⁰ The interior grasslands, lying in the rain-shadow of the Atlas ranges, were pastured by big herds of horses and cattle belonging to the nomads of Numidia and Mauretania.²²¹ These supplied the Numidian cavalry which formed an important part of Hannibal's forces in the Second Punic War, and constituted the major part of Massinissa's army, Scipio's ally, in the Roman campaign in Africa.²²²

Farther east, on the Cyrenaican coast of Africa, the plateau of Barca (elevation 2,000 feet or 610 metres) was high enough to condense winter rains in this otherwise arid belt, and therefore to support good but ephemeral pastures for horses and cattle back to the margin of the desert.²²³ Springs issuing from the escarpment and base of the limestone highland irrigated fields and hay meadows. Hence the Greek colony of Cyrenaica enjoyed a great reputation for horse

²¹⁷ Strabo, III, ch. I, 8.

²¹⁸ Strabo, III, ch. II, 6.

²¹⁹ Polybius, XXXIV, 8.

²²⁰ Diodorus Siculus, XX, ch. I, 8.

²²¹ Strabo, XVII, ch. III, 7, 9, 19. Mommsen, *Provinces of the Roman Empire*, vol. II, p. 368.

²²² Polybius, III, ch. 35, 65, 68, 71, 72, 113, 114, 117; XV, ch. 3, 5, *et passim*.

²²³ Arrian, *Indica*, ch. 43.

breeding in antiquity.²²⁴ Its kings frequently won the chariot races in the Greek Games and became the theme of many a Pindaric ode.²²⁵ The colonists doubtless purchased horses from the neighboring nomads, whose route to the coast ran right past the city of Cyrene,²²⁶ and then improved the animals by good feeding and training.

PASTORAL NOMADISM ON THE ARID MARGINS.—Horses and cattle, sheep and goats, formed the chief wealth of the nomads who hung on the semi-arid outskirts of the Mediterranean lands, and ranged widely in search of grass. Their animals drifted into the markets and stockfarms of the sedentary Mediterranean peoples in a dozen different ways,—by purchase at border trading-post or town, by capture during nomadic invasions or in the subsequent punitive expedition of the farmer nations, or by the employment of nomad cavalry as allies or mercenaries in war. This was especially the case with horses and cattle whose importation when full-grown worked an economic saving in countries of limited pasturage. As a corollary, this saving was greater, as a rule, in eastern Mediterranean lands than in western.

The sources from which such imports were drawn were not limited to the semi-arid regions to the south and east of the Mediterranean; they included the European steppes bordering the Black Sea and the well-watered districts north of the Alpine barrier. Cattle, hides and wool were regularly purchased by the ancient Greek traders from the Scythians of the Euxine coast,²²⁷ and they were also imported into Italy from the upper Danubian plains by the passes of the Julian Alps and Carso Plateau.²²⁸ Marine transportation of live animals presented no problem, as has been shown.

Thus the economic history of the Mediterranean lands can never ignore the factors of climate, relief, and the uniting force of the *Mare Internum*.

²²⁴ Strabo, XVIII, ch. III, 2.

²²⁵ Pindar, Odes, Pyth, IV, V.

²²⁶ E. Curtius, History of Greece, vol. I, pp. 486-487. N. Y. 1867.

²²⁷ Ibid. vol. I, pp. 440-441.

²²⁸ Strabo, V, ch. I, 8.

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THE TEMPLED PROMONTORIES OF THE ANCIENT MEDITERRANEAN*

Ellen Churchill Semple



FIG. 2—Cape Taenarum.

THE traveler who crosses the Aegean Sea from Smyrna to Athens is greeted at the threshold of Greece with a vision of ancient Hellenic beauty. As he rounds the bold promontory of Sunium, which marks the tip of the Attic peninsula, he beholds far up above him the temple of Poseidon crowning the headland, outlined against a sky blue as the cloak of the Madonna. Below it the cliffs of white crystalline limestone drop sheer for two hundred feet down to a cobalt sea, whose waves are fretted into lace as they break upon the rocks. Above, the white marble temple gleams in the early morning sunshine, posed between blue and blue. It is an arresting vision. No signs of life are near, except where a half-deserted cove, exposed to the fury of the southwest winds, receives an occasional boat or fisherman's smack. Why was the temple placed there? A location so striking seemed to indicate a compelling reason. One surmised that it might be either the welcome home for the returning fleet or merchantman of ancient days or a pious expression of thanks for a safe voyage which stirred in the hearts of the Attic sailors. But this reason seemed inadequate. Therefore one was moved to question

* Read before the twenty-third annual meeting of the Association of American Geographers at Philadelphia, December 28-30, 1926.

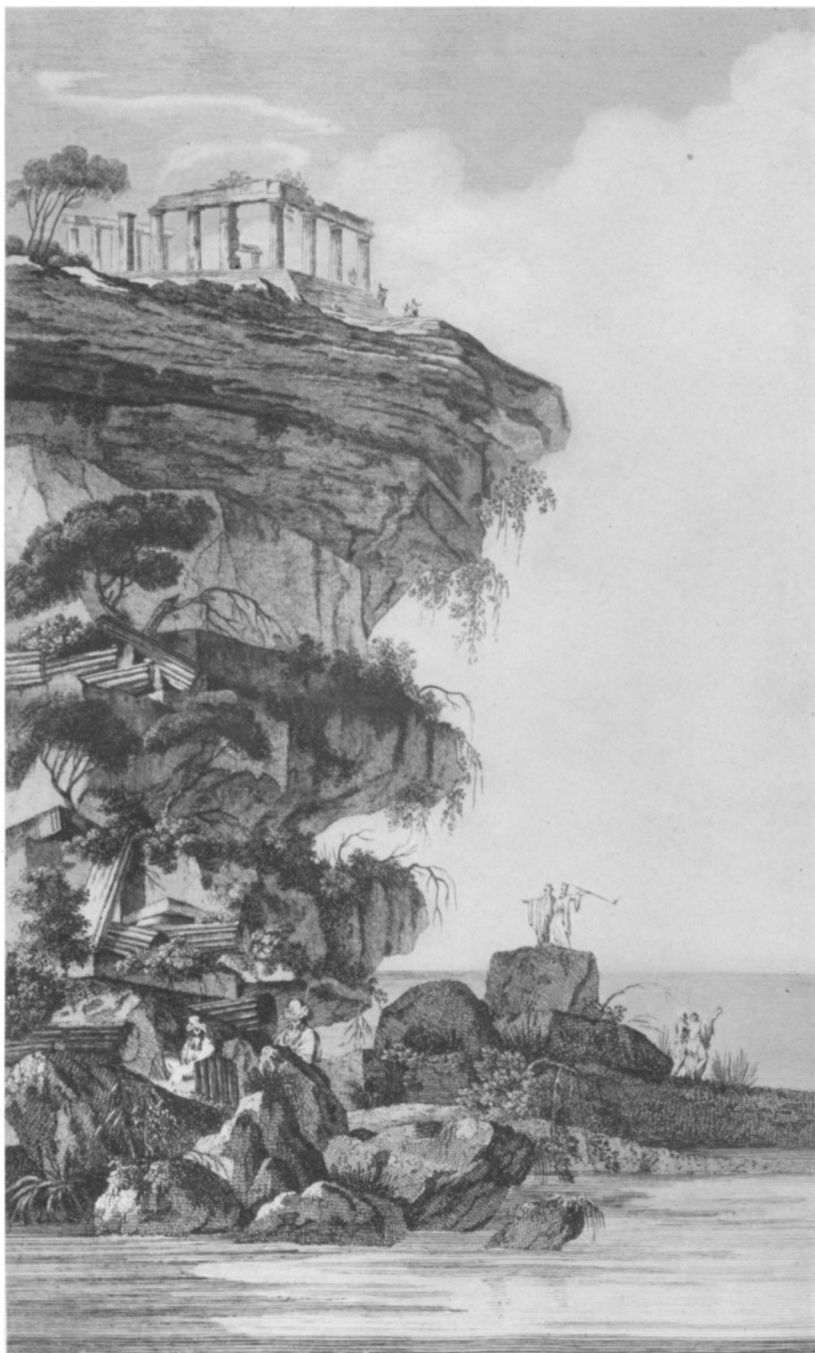


FIG. 1—The Poseidon temple on Cape Sunium (Cape Colonna). (From J. B. Lechevalier: *Recueil des cartes, plans, vues et médailles, pour servir au voyage de la Troade*, Paris, 1802.)

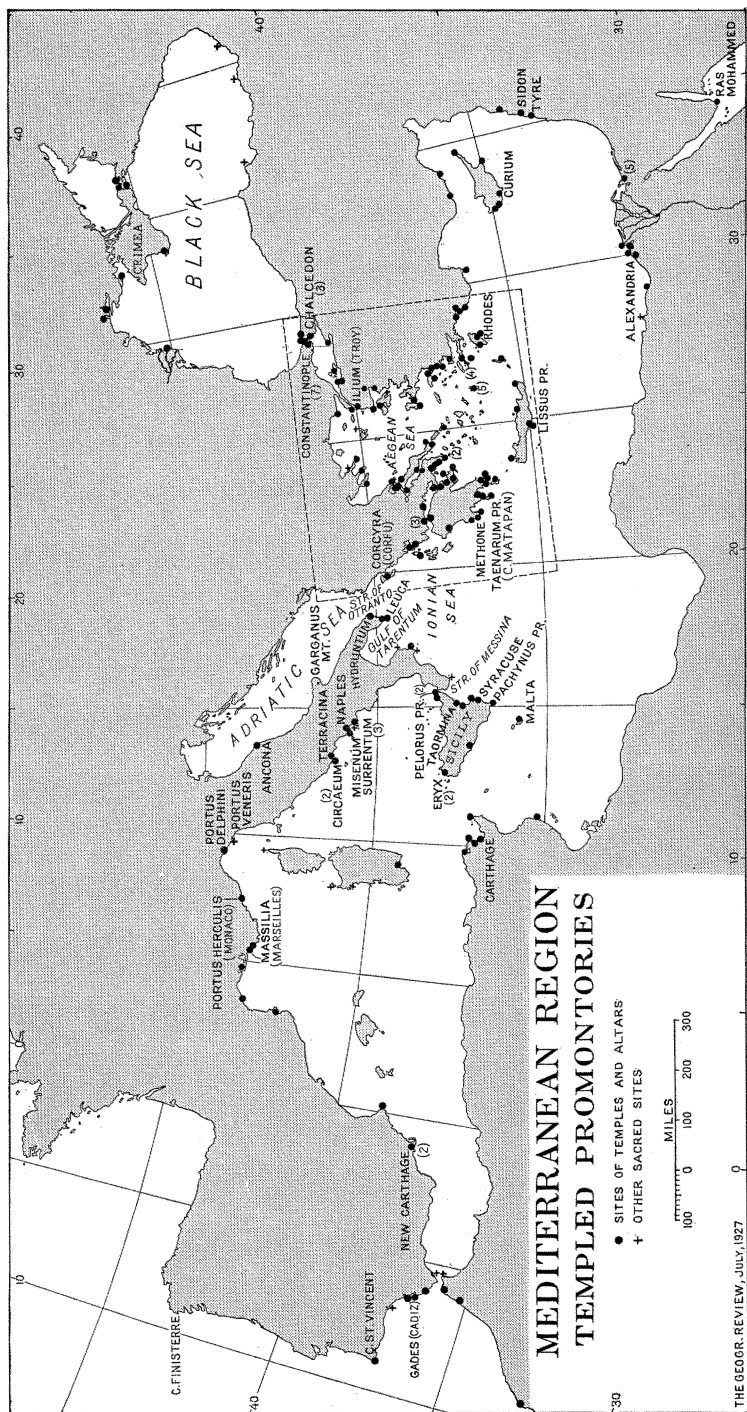


FIG. 3—Map of the Mediterranean region showing distribution of headland sanctuaries identified from classical literature. The dots show sites where altars or temples are known to have existed. Crosses show headlands regarded as sacred but lacking record of altar or temple. See Figure 4 for an enlarged map of the Aegean area. Scale of map, 1:25,000,000.

Use was made of the following authorities: Aeschylus, Anyte, Apollonius Rhodius, Appian, Archilochus, Aristophanes, Aristotle, Athenaeus, Catullus, Cicero, Diodorus Siculus, Euripides, Herodotus, Hesiod, Homer, Homeric Hymns, Horace, Josephus, Juvenal, Livy, Lucan, Macrobius, Ovid, Pausanias, Philostratus, Pliny the Elder, Plutarch, Polybius, Pomponius Mela, Procopius, Ptolemy, Scylax, Seneca, Sophocles, Strabo, Suetonius, Tacitus, Thucydides, Vergil, Virgil, Xenophon.

whether there were other temples crowning other promontories on the busy sea lanes of the ancient Mediterranean. Moreover, out of the days of one's early Latinity, out of the murk of dative case and subjunctive mood, there loomed faint memories of temples along the southern promontories of Italy mentioned in the Aeneid, shrines to Athene and Hera and Castor and Pollux, those patron saints of ancient seamen.

The next move was to search the Mediterranean shores for these headland sanctuaries by throwing out a dragnet over all classical literature for the evidence, drawing in the facts from Homer and from Procopius, from Juvenal and from Livy. This research extended over fourteen years and is still incomplete. However, it assembled sufficient material to furnish a basis for some geographical conclusions. The investigation yielded one hundred and seventy-five of these promontory shrines, besides over a dozen consecrated headlands, known to the ancients as sacred but lacking any surviving record of altar or temple. Numerous other cases, not here included, rested upon suggestive but incomplete evidence.

DISTRIBUTION OF PROMONTORY TEMPLES

These sanctuaries were found to be distributed from the tip of the Sinai peninsula in the Red Sea,¹ a notorious spot for conflicting winds and currents dreaded by Greek and Roman seamen, all the way west to the angle of Portugal at Cape Finisterre, where a rude cairn of stones marked the consecrated worship of an ancient Melkart or Heracles.² They reached also from the Crimean Bosphorus, where they clustered thick along the sea ways leading to the Scythian grain-fields, south to Egypt and west to the headland of the Pyrenees,³ where these mountains stretch out the rocky skeleton of an arm before they dive beneath the waves of the Mediterranean.

From the accumulated data it became possible to formulate certain generalizations as to the distribution of these headland sanctuaries, and even to conjecture their former sites while the facts were still unknown. Given certain winds and currents at certain promontories, a summit shrine or altar was almost inevitable, and nine times out of ten it was eventually located. For instance, the port of Ancona on the northeast coast of Italy, sheltered from the bora by a rocky cape of elbow form, is mentioned by Livy and Procopius as chief Adriatic naval base of the Romans. Search for nearer details about Ancona led through the poems of Catullus and the satires of Juvenal⁴ and established the fact of a temple to the marine Aphrodite, built by the

¹ Strabo, *Geography*, XVI, 4 : 18.

² Strabo, *op. cit.*, III, 1 : 4.

³ *Ibid.*, IV, 1 : 3.

⁴ Catullus, 36, 13 : Juvenal, IV, 40.

original Syracusan colonists to their tutelary deity. Local tradition in Ancona places the site of this temple on the tip of Monte Guasco promontory, whence the cathedral of Saint Ciriaco now overlooks the town (Fig. 5); but Peruzzi states that the ruins of the ancient temple, together with the extremity of Monte Guasco itself, fell into the Adriatic during an earthquake in 558 A. D.⁵

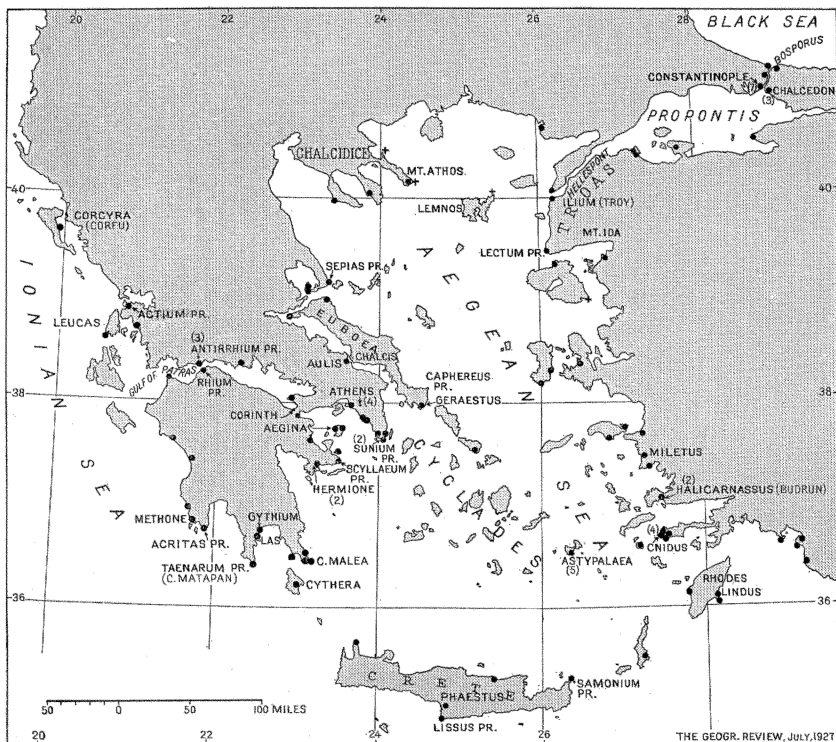


FIG. 4—Sacred headlands of the Aegean area. See the explanation accompanying Figure 3. Scale of map, 1:7,500,000.

FORMS OF HEADLAND SANCTUARIES AND THEIR ANTIQUITY

The form of these headland sanctuaries was varied. One type was the imposing Doric temple to Poseidon on the Sunium promontory (Figs. 1 and 7), or the rich fane of Venus of Eryx on the northwest angle which Sicily thrusts forward into the Tyrrhenian Sea.⁶ A simpler form was the sacred grove with its shrine or marble canopy over the statue of the god, like the sacred precinct of Artemis on the northeast promontory of Euboea.⁷ Most primitive was the wave-

⁵ F. Hamilton Jackson: *The Shores of the Adriatic: The Italian Side*, London, 1906, p. 225.

⁶ Polybius, *Histories*, I, 55; Diodorus Siculus, *Bibliotheca historica*, IV, 83.

⁷ Herodotus, *Histories*, VII, 176; Plutarch, *Life of Themistocles*, VIII.

wrought cave which nature provided as a local shelter for altar or wooden image of the deity.⁸ Pausanias mentions a cave with an image of Poseidon on Cape Taenarum. On the limestone walls of such grottoes grateful prayers have been found, inscribed by ancient seamen saved from shipwreck near the stormy headlands.

Most of these headland sanctuaries date back to the gray dawn of history. They were ascribed by the ancients to legendary builders of various races, like Orion, Daedalus, Heracles, Jason and the Argonauts, Cadmus, Danaus and his daughters, Neleus, Ulysses, Agamemnon, and Aeneas. The Tyrian Heracles, or Melkart, sea Baal of Phoenicia, had a large number to his credit. Many of the famous temples of historical times, like that of Sunium, Eryx, and the Lacinium cape (Capo Colonne) of southern Italy, were erected on the foundations of far earlier sanctuaries.⁹ The original temple of Apollo Branchidae, or Didymus, crowning the Milesian promontory of the Ionian coast, antedated the Ionian immigration and the founding of Miletus.¹⁰ The temple of Artemis on the Lindus promontory of Rhodes was also pre-Hellenic.¹¹

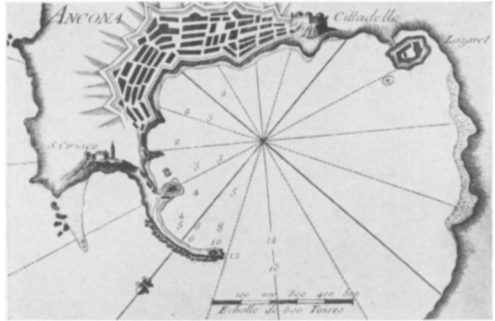


FIG. 5—The harbor of Ancona showing the cathedral of San Ciriaco on Monte Guasco on the site of which local tradition places a temple of Venus. (From Pl. 78 of "Recueil de 155 des principaux plans des ports et rades de la Méditerranée" . . . , Genoa, 1801.)

In some cases a succession of deities were enthroned on these promontories. Maritime traders, colonists or oversea invaders brought their new gods and grafted them upon local divinities already established on the sacred headlands. The primitive sea goddesses Dictynna and Britomartis of Minoan Crete left their names and legends attached to certain rocky capes of the island,¹² but they themselves merged more or less into Artemis of the Doric invaders; later in the composite form of Dictynna Artemis they were transplanted in turn to various promontories of Greece and the Cyclades Islands.¹³ In all cases the new incumbents succeeded to the site and its appropriate office, for all performed the divine function of protecting seamen.

⁸ Pausanias, *Description of Greece*, III, 25 : 4.

⁹ M. P. Nilsson: *Griechische Feste von religiöser Bedeutung*, Leipzig, 1906, p. 63; E. A. Freeman: *The History of Sicily, from the Earliest Times* (4 vols., Oxford, 1891), Vol. I, pp. 199-209.

¹⁰ Pausanias, *op. cit.*, VII, 2, 3.

¹¹ Diodorus Siculus, *op. cit.*, V, 58; Herodotus, *op. cit.*, II, 182.

¹² Herodotus, *op. cit.*, III, 59; Strabo, *op. cit.*, X, 4 : 12-14.

¹³ Pauly-Wissowa: *Real-Encyclopädie der classischen Altertumswissenschaft*, article "Diktynna."



FIG. 6—The Leucadian Promontory, the southern tip of Leucas, site of a temple of Apollo. In the left background, Ithaca, to the right Cephalonia. (From William Gell: *The Geography and Antiquities of Ithaca*, London, 1807.)

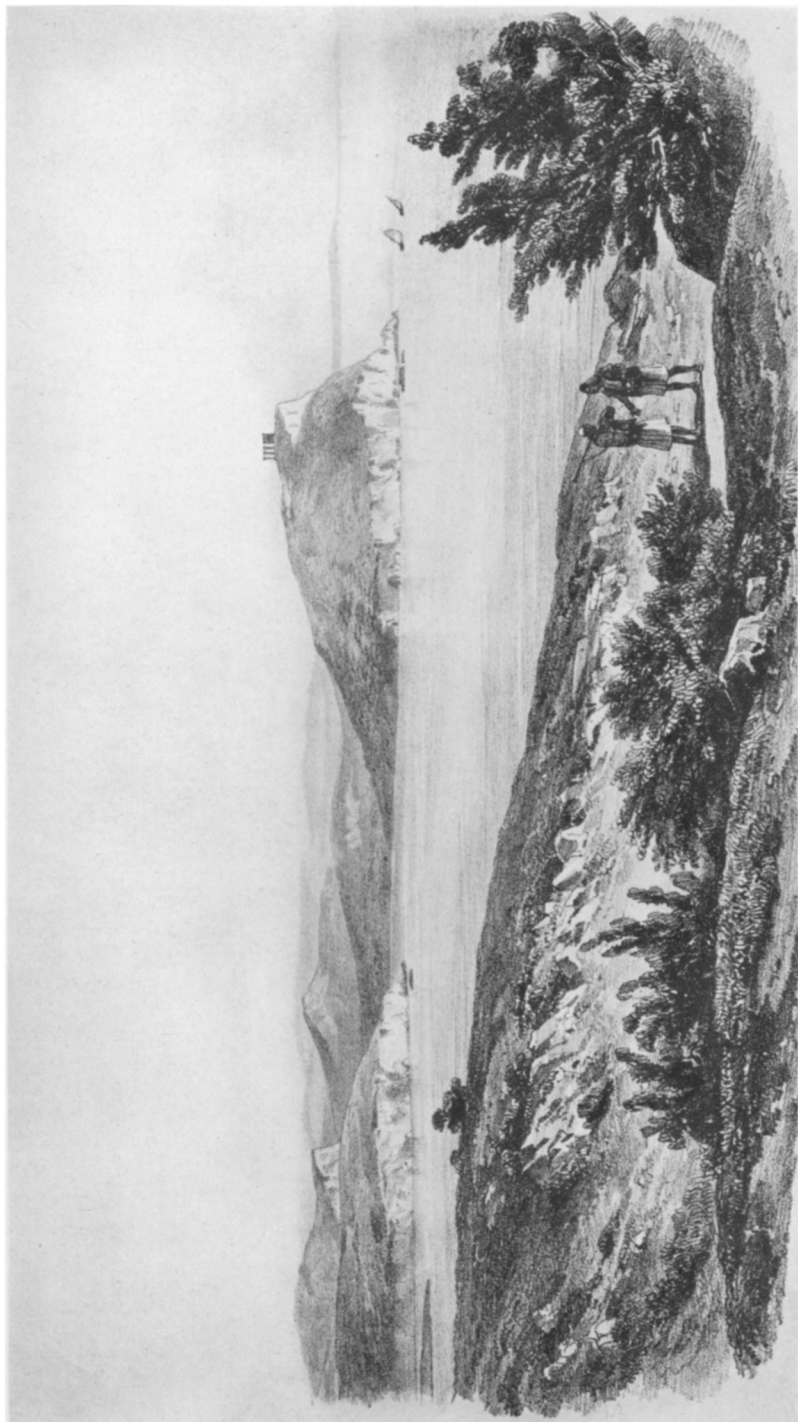


FIG. 7—Cape Sunium and its temple. (From O. M. Baron de Stackelberg: *La Grèce, Vues pittoresques et topographiques*, Paris, 1834, Vol. 2.)

WINDS AND CURRENTS

The importance of these promontories to ancient seamen is apparent in all classical literature. For the coastwise navigation of ancient and medieval times, when no compass directed the timid sailor, these headlands were sea marks for the groping prows of Greece and the adventurous sails of Tyre, for the beaked boat of the pirate as it nosed its way along the trail of the prey. The high relief of the Mediterranean coasts made the headlands conspicuous during the four summer months that formed the season of navigation, for then no fog or mist blurred their outlines. But their high relief also converted the straits and bays enclosed by them into sea canyons, through which the winds swept with restless violence in July and August when the northern air currents, the etesians of the Greeks whose marked regularity was noted by Hesiod,¹⁴ reached their maximum strength. In June and September, when the prevailing winds shifted from north to south or from south to north, these headlands were points of conflicting gales and raging surf. They were known to the ancient seamen as places of severe storms, especially the wind storms of the Mediterranean summer. The poet Archilochus, who wrote in 700 B. C., gives us the picture:

Behold, my Glaucus, how the deep
Heaves, while sweeping billows howl,
And round the promontory steep
The big black clouds portentous scowl.

Many of these promontories were notorious, like Cape Malea, whence Jason, Ulysses, Menelaus, and countless other mariners were swept by the violent north wind south past Cythera and Crete to the African coast, hundreds of miles from their projected course.¹⁵ The reputation of Malea was embodied in an ancient adage of Greek sailors, "If you pass beyond Malea, forget your home." Equally notorious was Mt. Athos, which capped the long eastern prong of the Chalcidice peninsula with a marble mass 6350 feet high. It was a seamark for all navigators in the northern Aegean, visible for long distances. At the summer solstice at sunset it cast a shadow fifty miles across the Aegean to the island of Lemnos and made early twilight in the market place of Myrina.¹⁶ Thus it was a guide to seamen but also a terror. On its rocky base the Persian fleet in 490 B. C. was dashed to pieces by the northeast wind;¹⁷ therefore Xerxes ten years later cut a canal across the base of the peninsula, that his fleet might pass in safety.¹⁸ The headlands of Sicily and Italy which abut upon the Strait of

¹⁴ For a meteorological description see J. S. Paraskévopoulos: The Etesians, *Monthly Weather Rev.*, Vol. 50, 1922, pp. 417-422.

¹⁵ Homer, *Odyssey*, III, 287; IV, 514; IX, 79-83; Herodotus, *op. cit.*, IV, 179.

¹⁶ Apollonius of Rhodes, *Argonautica*, I, 601-606.

¹⁷ Herodotus, *op. cit.*, VI, 44, 95.

¹⁸ *Ibid.*, VII, 22, 23.

Messina converted the local tidal currents into a whirlpool, whose perils were embodied by the ancients in the monster myths of Scylla and Charybdis. Its evil reputation was not confined to legendary times when Ulysses and Aeneas shuddered at its terrors; for its tidal eddies embarrassed the Roman and Carthaginian fleets during the second Punic War.



FIG. 8—A seventeenth-century conception of the Strait of Messina. The strait is pictured from the northern entrance: on the left the Calabrian coast with Reggio; on the right Etna with the town of Messina at its foot. (From "Theatrum celebriorum urbium Italiae, aliarumque in insulis Maris Mediterranei," Joannes Janssonius, Amsterdam, 1652?).

These promontories often caused vexatious delays. Ancient sailing vessels, like modern steamers, had to wait for days till the contrary winds subsided enough for the vessels to round the headlands. The Lectum promontory, forming the southwest end of the Troad peninsula, was a critical point on the sailing route along the eastern shore of the Aegean; for the etesian winds of midsummer swept down from the Black Sea and swirled around this headland with a force which daunted the bravest seaman. Here in the summer of 479 B. C. the Hellenic fleet, bound for the Hellespont from the victory over the Persians at Mycale on the Asia Minor coast, had to moor their ships on the leeward side of Lectum for several days, "being stopped from their voyage by the winds," Herodotus tells us.¹⁹ This was a common experience, evidenced by an altar to the Twelve Great Gods which crowned the summit of Lectum and was said to have been dedicated by Agamemnon himself.²⁰ The fleet of Corcyra, summoned

¹⁹ *Ibid.*, IX, 114.

²⁰ Strabo, *op. cit.*, XIII, 1 : 48.



FIG. 9—The entrance to the Black Sea from the Bosphorus. (From Julia Pardoe: *The Beauties of the Bosphorus*, London, 1839. Original drawing by William H. Bartlett.)

to aid the Greek forces at the battle of Salamis, arrived after the fighting was over, claiming that they had been unable to round Cape Malea against the etesian winds, a plausible excuse.²¹

FAMILIAR LANDMARKS

But these promontories were also the first points of the homeland to greet the returning seaman after his eventful voyage, or they marked his arrival in familiar waters. Hence at one of the harbors which usually flanked the ends of the headlands, he beached his ship if the sea was calm and climbed to the summit sanctuary to offer his thanks for a safe journey. Classical literature gives us many instances of this. Jason and the Argonauts, returning from the shadowy land of Colchis and the rocky coast of the Caucasus, rejoiced on reaching the headland that marked the northern entrance of the familiar Bosphorus and there built an altar to the Twelve Great Gods.²² Ever afterwards this spot was sacred and became the site of a temple to Zeus. The Greeks returning from the siege of Troy under Nestor landed at the promontory of Geraestus, which formed the lofty southern tip of Euboea, and there at the temple of Poseidon they sacrificed cattle as a thank offering for their safe return.²³ Another group of these victorious warriors had been shipwrecked on the notorious Cape Caphereus

²¹ Herodotus, *op. cit.*, VII, 168.

²² Pomponius Mela, *De situ orbis*, I, 19 : 37; Polybius, *op. cit.*, IV, 39.

²³ Homer, *op. cit.*, III, 176.



FIG. 10—The bold headlands of the Sorrento Peninsula. (From "Atlante geografico e illustrativo della corografia dell' Italia," [Florence, 1845?], Vol. 4.)

twenty miles to the north, and their fate served to emphasize the good fortune of Nestor and his companions.²⁴

Hence these rock-bound capes became the sites of temples, mute prayers in stone for divine protection from the perils of the deep, till the Greek mind came to regard the wooded *temenos*, or sacred precinct, as the normal appurtenance of a promontory. Ajax, dying in the distant Troad, thus describes his native island of Aegina:

Paths of the dashing surge,
Caves by the ocean's edge,
Grove on the promontory brow.²⁵

MEMORIALS AND TOMBS ON PROMONTORIES

The tendency to regard promontories as rocky thrones, whence the gods watched over the maritime ventures of men, probably explains the ancient custom of commemorating naval victories by erecting trophies on neighboring headlands, usually in a temple precinct. The Greeks set up a circle of white stone pillars around the temple on the Artemisium promontory of northeast Euboea as a thank offering for the destruction of the Persian fleet in the strait below (480 B. C.). The Athenians, after their victory over the Spartans at the battle of Naupactus (429 B. C.), erected a trophy and dedicated a captured ship in the temple of Poseidon on the Rhium promontory, whence the

²⁴ Ovid, *Metamorphoses*, IV, 472; XIV, 481.

²⁵ Sophocles, *Ajax*, 412.

friendly god had looked down on the engagement in the Corinthian Strait. Augustus Caesar registered his gratitude for the naval victory of Actium by enlarging and beautifying the very ancient temple of Apollo which crowned this headland. Occasionally a promontory received its first dedication by such trophies; as when Corcyra won its great victory over the Corinthian fleet in 435 B. C. and, to commemorate the event, raised a monument on Cape Leucimne, a southern head-



FIG. 11—The harbor of St. Nicholas, Cythera. The temple of Aphrodite lay a few miles inland. (From Stackelberg, *La Grèce*, Vol. I.)

land of the island hitherto unmarked by any sanctuary, though one is prone to surmise there some native Corcyrean shrine whose god protected his own.

The sanctity attached to headlands probably explains the ancient custom of placing on them the tombs of heroes, consecrated with altars and monuments. In time the tombs developed into temples and the heroes into gods. The rocky capes that flanked the southern portal of the Hellespont were crowned with sepulchers, raised to the heroic dead of the Trojan War. The high tip of the Chersonesus held the Protesilaeum, tomb and temple of Protesilaus, the first Greek chief killed in the Trojan campaign.²⁶ The fane grew in sanctity and wealth for centuries; in 480 B. C. it was pillaged and defiled by the Persian viceroy, who, according to Herodotus,²⁷ paid dearly for the desecration. On a minor headland near by was the sepulcher of Hecuba, queenly victim of the war;²⁸ and four miles across the swift-flowing Hellespont was the Sigeum promontory, the Westminster Abbey of the early Hellenic race. There under blue Aegean skies rose the temple and tomb of Achilles, which held also the ashes of Patroclus²⁹ and on which the great Alexander placed a wreath of tribute; there also was the tomb of Antilochus. Three miles beyond, overlooking the mouth of the Scamander, was the Rhoeteum promontory with its sepulchral temple of Ajax.

²⁶ Thucydides, *History of the Peloponnesian War*, VIII, 102; Strabo, *op. cit.*, XIII, 1 : 31.

²⁷ Herodotus, *op. cit.*, IX, 116-120.

²⁸ Strabo, *op. cit.*, XIII, 1 : 28.

²⁹ Homer, *op. cit.*, XXIV, 75.

This method of consecrating promontories was not confined to the heroic age. The tomb of Themistocles has recently been identified on the blunt headland overlooking the outer harbor of the Piraeus from the north; and, with rare appropriateness, straight across the harbor channel on the Acte promontory rises the sepulchral monument of the Greek Miaulis, naval hero of the War of Liberation (died 1855). On the west coast of Italy, Cape Palinuri, Cape Miseno, and the promon-



FIG. 12—Modon, the ancient Mothone, a sheltered harbor west of Cape Acritas. (From Stackelberg, *La Grèce*, Vol. I.)

tory of Gaeta all owe their names to the tombs of heroic seamen who explored this coast with Aeneas.

Achilles, the son of Thetis, developed into a genuine promontory god. The Euxine and the Propontis became his special domain, and there he was worshipped as the "lord of the Pontus."³⁰ His altars tipped many a sand and boulder spit along those coasts, and he had a famous sanctuary on Leuce, "the shining island" near the mouth of the Danube whose warders were sea birds;³¹ but he also received divine honors on the Aegean island of Astypalea.³²

THE PROMONTORY GODS

There was a large variety of these promontory gods. Some were primarily marine deities, like Poseidon, Castor and Pollux, the deified Achilles³³ and his goddess mother Thetis who presided over the rocky headland of Sepias. Here the northeast wind from the Black Sea dashed to pieces the Persian fleet of Xerxes as it was preparing to enter the rocky channel of the Euboean sound.³⁴ The universal maritime activity of the Mediterranean coast peoples, however, diverted other gods from their original tasks to assist the struggling sailor. Zeus became Zeus Soter, savior of seamen, and was assisted in this task by

³⁰ J. B. Bury: *A History of Greece to the Death of Alexander the Great*, 2nd edit., London, 1913, p. 92.

³¹ Strabo, *op. cit.*, VII, 3 : 16.

³² Cicero, *De natura deorum*, III, 45.

³³ Bury, *op. cit.*, p. 92.

³⁴ Herodotus, *op. cit.*, VII, 191.

Hera, or Juno. Apollo, Athene, and Hermes, god of travelers, were also enlisted in a like service.

Yet remoter deities from inland countries were set to work at the alien duty of helping the ancient navigators. Interesting in this connection is the evolution of Astarte, crescent-crowned moon goddess of Assyria, giver of fertility. She became known to the Phoenicians, who traded along the piedmont route of northern Mesopotamia, as a deity of great power; so they adopted her and took her to their crowded ports on the coast of the Lebanon Mountains. Having little use for her fertilizing powers, they made her patron goddess of their busy merchantmen. The Tyrians placed her figure at the prow of their boats, where she breasted the Mediterranean waves; and they took her on all their wide voyages, to set her up on capes and headlands beside their distant factories and colonies. Tyrian traders introduced her among the Hellenic colonies of Asia Minor, where Astarte became identified with Artemis and achieved fame as the Diana of Ephesus. This hybrid goddess of the crescent was adopted by many Aegean Greek cities as the patron of seamen. She became identified with sea-born Aphrodite, goddess of love and fertility, and as such her worship spread from the Tyrian colony on the little island of Cythera among the peninsular Greeks; but she still retained her Phoenician rôle of patron goddess of seaman.³⁵ Among the Romans she merged into Venus. Under these various names, but maintaining an identical character, she can be traced all the way from Sidon and Ascalon³⁶ to Massilia and the Spanish coast, along the sea tracks of Phoenician and Greek settlers.

The Tyrians gave a like distribution to the sanctuaries of their local sea Baal Melkart, who became identified with the Greek Heracles and in this character had his temples and altars on widely scattered headlands from Tyre to the sacred promontory of Iberia. Under his Roman name he presided over the Pillars of Hercules, where he looked down upon the full current and strong winds of the famous strait. Malign deities represented the terrors of dangerous headlands and were embodied in the Scylla monster who destroyed ships in the whirlpool of the Strait of Messina;³⁷ she also occupied the Scyllaeum promontory of southeastern Argolis,³⁸ where the etesian winds at midsummer swept around the end of this peninsula. Similar was the Italian Circe who lured seamen to their destruction on the surf-beaten rocks of the Circaeum promontory.³⁹ Similar too were the Sirens, localized by legend on the rocky islets off the Sorrento peninsula.

³⁵ Pauly-Wissowa, article "Astarte."

³⁶ Herodotus, *op. cit.*, I, 105.

³⁷ H. F. Tozer: *Lectures on the Geography of Greece*, London, 1873, p. 77.

³⁸ Pausanias, *op. cit.*, II, 34 : 7-8.

³⁹ Cicero, *op. cit.*, III, 48; Vergil, *Aeneid*, VII, 10-24; Apollonius of Rhodes, *op. cit.*, III, 312; Strabo, *op. cit.*, V, 3 : 6.



FIG. 13—The central peninsula of the Peloponnesus with its termination in Cape Taenarum (C. Matapan). (This view and Figure 2 from Stackelberg, *La Grèce*, Vol. 1.)

All of these deities, both beneficent and malignant, had their seats upon the headlands of the Mediterranean shores. A fragment of Sophocles thus apostrophizes the god of the sea:

Thou Poseidon, who art lord over the cliffs and glassy
waves of the wind-swept Aegean, behold thy dwelling place
on the lofty crags of all the harbors.

Poseidon was "enthroned on Geraestus and Sunium bold," according to Aristophanes.⁴⁰ He had his famous sanctuary on the long promontory of Cape Matapan, the ancient Taenarum (Fig. 13), where a grove and cave sheltered the image of the god.⁴¹ The little harbor to the northeast of the sacred precinct was a refuge for storm-driven seamen; it was also the starting point for the voyage south to Crete and Africa and thence to Egypt.⁴² The Venetians later called it the Bay of the Quails, because these birds of passage assembled there for their flight to the winter grainfields of Egypt.

In like manner Apollo was ensconced upon the windy promontories. "Many are thy fanes and groves, and dear to thee are all the headlands," sings the Homeric hymn to Apollo.⁴³ He frequently shared these sites with Artemis, who "was goddess of the stormy headlands." Aphrodite was called "the giver of fair voyages," "she who keeps a lookout from the headlands," "Aphrodite of the Heights." On a little promontory which sheltered the port of the city of Aegina from the north winds was a temple dedicated to "Aphrodite of the Harbor" (Figs. 15 and 16), now marked by a single surviving column.⁴⁴ Her

⁴⁰ Aristophanes, *The Knights*, 559-560.

⁴¹ Strabo, *op. cit.*, VIII, 5 : 1; X, 1 : 7; Pausanias, *op. cit.*, III, 25 : 4.

⁴² Conrad Bursian: *Geographie von Griechenland* (2 vols., Leipzig, 1862, 1872), Vol. 2, p. 150.

⁴³ Homeric Hymn to Apollo, 143-144.

⁴⁴ Pausanias, *op. cit.*, II, 29 : 6.



FIG. 14—The temple of Athene in Aegina. In the background the coast of Attica. (From Stackelberg, *La Grèce*, Vol. 1.)

character is described by Anyte of Arcadia, who wrote in 700 B. C. a poem to Aphrodite of the Sea:

Cythera from the craggy steep
Looks downward on the glassy deep,
And hither calls the breathing gale
Propitious to the venturous sail,
While Ocean flows beneath serene,
Awed by the smile of Beauty's Queen.

The ancient Greek city of Cnidus, which occupied the rocky tip of the Triopium promontory on the southwest coast of Asia Minor, dedicated its oldest sanctuary to the Bountiful Aphrodite, a later one to Aphrodite of the Height, and a third to the Aphrodite of the Fair Voyage.⁴⁵ This Cnidian Aphrodite was clearly a Greek form of the Phoenician Astarte, who appears on the island of Samos as Hera,⁴⁶ and as Artemis in Hellenic Euboea and on the native shores of the ancient Argonauts. Orpheus, bard of these daring explorers, according to Apollonius Rhodius "sang of the Savior of Ships, Artemis, her that holds the headlands of these seas in her keeping."⁴⁷

Athene also was drawn into the service of the Mediterranean seamen. She had her temple on "sacred Sunium,"⁴⁸ near the famous shrine of Poseidon, and shared with him the task of assisting seamen to round this windy promontory. As "Guardian of the Anchorage" she had her sacred seat on a rocky cape sheltering the port of Hermione on the southern coast of Argolis, while a temple of Poseidon kept its

⁴⁵ *Ibid.*, I, 1 : 3.

⁴⁶ *Ibid.*, VII, 4 : 4-5; Encyclopaedia Britannica, article "Hera."

⁴⁷ Apollonius of Rhodes, *op. cit.*, I, 568.

⁴⁸ Homer, *op. cit.*, III, 278.



FIG. 15—Ruins of the Temple of Aphrodite at Aegina as seen in the late eighteenth century. Compare Figure 16. (From "The Antiquities of Ionia," Part II, Society of Dilettanti, London, 1797.)

lookout on a neighboring headland.⁴⁹ Athene was "mistress of the winds" in her sanctuary on the southwest promontory of Messenia, where she protected the sailors seeking their home port of Mothone (Fig. 12);⁵⁰ for this point was exposed to the storms that swoop down from the Adriatic and to the violent south winds of spring that bring rain from the coast of Africa.

CHRISTIAN SAINTS REPLACE THE PROMONTORY GODS

These gods have passed, but their function still remains; their headlands are not deserted. In the Aegean Sea nearly all these high temple sites are occupied today by little chapels of St. Nicholas, the patron saint of sailors brought up in the Greek Catholic Church. St. Nicholas is dear to the heart of the modern Aegean seamen. His icon is fastened to the mast of every fishing boat, and below it hangs an ever-burning lamp. Prayers ascend to him in every storm, and sacrifices of salt and bread are cast into the sea by the pious sailors when they round his promontories.⁵¹ Many of these little churches are located on the very site of the ancient pagan sanctuaries, and one may see sculptured stones from an Aphrodite or Poseidon temple built into the chapel walls. In the western Mediterranean, in the realm of the Roman Catholic Church, the Virgin Mary is the *Stella Maris*, Star of the Sea, to the modern sailor; humble successor of Artemis and Venus, she has her chapel or church on the site of ancient temples and is besought in prayer by the modern Sicilian or Italian sailor for a safe voyage.

⁴⁹ Pausanias, *op. cit.*, II, 34 : 8-10.

⁵⁰ *Ibid.*, IV, 35 : 1, 5, 6.

⁵¹ Mary Hamilton: *Greek Saints and Their Festivals*, Edinburgh and London, 1910, pp. 28-31.

HARBOR PROMONTORIES AND THEIR SANCTUARIES

These promontory sanctuaries reveal two geographic principles in their distribution. They appear singly or in groups about the harbor entrances of active seaboard towns, where headlands run out like piers and protect the port from prevailing winds. The ancient sailing vessels evidently experienced difficulty in getting into harbor, though they used the diurnal winds for this purpose, as the Mediterranean



FIG. 16—The port of Aegina and the ruins of the temple of Aphrodite. In the middle distance is a chapel of St. Nicholas. (From Stackelberg, *La Grèce*, Vol. 1.) Stackelberg (1834) says: "It is reported that the better preserved of the two columns has fallen down and the débris used in the building of new houses."

sailor does today. But these sea breezes were comparatively weak and often were overpowered by the stronger currents of air. Moreover, along the steep coasts of the Mediterranean falling winds or squalls from the highland interiors added to the complexity of the wind systems and increased the difficulty of reaching port, especially on southward-facing slopes.⁵² They explain the successive headland temples along the whole south coast of Asia Minor and of the Troad along the base of Trojan Ida, of mountainous Crete and Rhodes, southern Italy, and the seaboard of the Alps and northern Apennines. Along the Italian Riviera, the Portus Herculis of ancient Monaco,⁵³ Portus Delphini⁵⁴ near modern Rapallo (Fig. 20), and Portus Veneris near Spezia had their names from promontory shrines.

These port sanctuaries were numerous. The ancient Hellenic colony of Massilia (Marseilles), by reason of its location near the mouth of the Rhone, lay in the path of the mistral, the desolating wind that pours down the Rhone valley from northern France and the Cévennes. The ancients knew it in winter to overturn loaded wagons crossing the Rhone delta and in the summer sailing season to buffet vessels entering or leaving the port of Massilia. The harbor was a natural basin between two limestone ridges of the Provence hills, which afforded

⁵² C. Naumann and J. Partsch: *Physikalische Geographie von Griechenland*, Breslau, 1885, pp. 104-107; Alfred Philippson: *Das Mittelmeergebiet*, Leipzig, 4th edit., 1922, pp. 96-97.

⁵³ Lucan, *Pharsalia*, I, 405; Strabo, *op. cit.*, IV, 6 : 3.

⁵⁴ Pliny, *Hist. nat.*, III, 7.

protection against the mistral and determined the selection of the site by the ancient Phocaean colonists. These Asia Minor Greeks, coming from a region long impressed with Phoenician cults, brought with them the worship of Artemis of Ephesus and erected a temple to her on the northern headland protecting the port, where today rises the old cathedral of Marseilles. On other bold points abutting on their harbor they built sanctuaries to Apollo and Poseidon and thus



FIG. 17—Ruins of a temple discovered in 1926 at Zoster. The Zoster Promontory on the west coast of Attica, a bold rocky headland, had altars to Apollo Zosterios, Artemis, Leta, and Athene Zosteria.

fortified themselves against the stormy mistral. Nor was this all. They planted their colonies and temples along the whole Mediterranean shore of Gaul and of the neighboring Iberia.⁵⁵ The remoter Massiliot colonies on the Spanish coast often found it impossible for weeks at a time to send their ships northward to the mother city against the mistral. They found it especially perilous to round the bold Pyrenean promontory, which was therefore crowned with a temple to Aphrodite.⁵⁶

The southwest coast of Asia Minor suffered from the falling winds from the highlands of Lycia and the plateau interior; so the Greek cities along this coast studded the promontory approaches to their harbors with sanctuaries of the helpful gods. The city of Cnidus was located on the tip of the Triopium peninsula and a near-by islet, which was linked with the mainland by a causeway and thus formed an anvil-shaped headland sheltering two harbors (Figs. 21 and 22). On the lofty island extremity Cnidus placed a famous temple of Apollo, sacred to seamen along all that coast,⁵⁷ and one to Poseidon, while in her three sanctuaries in the city Aphrodite was cherished above all its other gods.⁵⁸ Cnidus, by reason of its restricted territory, its barren rocky soil, its meager home resources, and its crossroad location on the great north-south and east-west trade routes of the eastern Mediter-

⁵⁵ Strabo, *op. cit.*, IV, 1 : 3-4.

⁵⁶ *Ibid.*, IV, 1 : 6.

⁵⁷ Thucydides, *op. cit.*, VIII, 35.

⁵⁸ Pausanias, *op. cit.*, I, 1 : 3.

raean, was early drawn into commercial and fishing ventures on the sea. Therefore its chief need was reflected in its worship of these sea deities. The near-by city of Halicarnassus, with a similar location and a similar career, had a harbor well protected both by nature and the gods (Figs. 23 and 24). A northern headland, in the form of a precipitous rock, contained its citadel and a temple of Aphrodite, while another sanctuary crowned the corresponding promontory on the

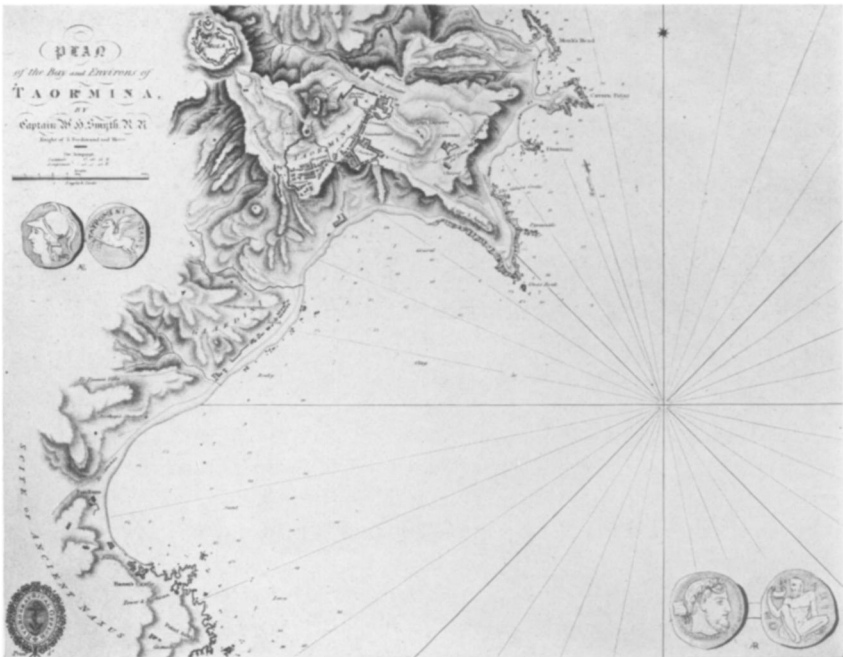


FIG. 18—Plan of the Bay of Taormina. Temples on the flanking promontories. Compare Figure 19. (From "The Hydrography of Sicily, Malta, and the Adjacent Islands; Surveyed in 1814, 1815, and 1816 . . . by Capt. William Henry Smyth," London, 1823.)

south.⁵⁹ The neighboring city of Miletus, famous in ancient commerce and colonization, was located on a club-shaped peninsula fronting the mouth of the Meander River (Figs. 25 and 26). The southern tip of this peninsula held an altar to Poseidon, said to have been founded in gray antiquity by Neleus, who established the Ionian colony of Miletus; while two miles inland on the promontory summit was the famous temple of Apollo of Didymus.⁶⁰ This was a rich sanctuary visible from afar, sought as a place of prophecy by all the dwellers of the Ionian coast. The temple itself was of Ionian origin, but it occupied the site of a far earlier sanctuary, which had probably been established by the early Carians of this coast.⁶¹

⁵⁹ Vitruvius, *De architectura*, II, 8; Diodorus Siculus, *op. cit.*, XVII, 23 : 4.

⁶⁰ Strabo, *op. cit.*, XIV, 1 : 5; Herodotus, *op. cit.*, V, 36; VI, 19; Pausanias, *op. cit.*, II, 10 : 5.

⁶¹ Pausanias, *op. cit.*, VII, 2 : 3.



FIG. 19



FIG. 20

FIG. 19—Looking from the ruins of the theater of Taormina to Capo Schiso and Mt. Etna. Compare Figure 18. Capo Schiso was the site of the temple of Apollo Archegetes mentioned by Thucydides and Appian, and possibly of the temple of Venus visited by Octavian. Site of Greek colony of Naxos.

FIG. 20—The refuge harbor of Portofino, the Portus Delphini of Pliny, or Port of Apollo the Dolphin God. On the extremity of the promontory, beyond the two castles in the picture, is the church of the Madonna del Capo.

On the peninsula of Greece the same story meets us. On Acte promontory, which sheltered the ports of Athens, a temple of Artemis protected the home-coming sailor.⁶² Corinth, located on the Isthmus of Corinth, had no available promontory, but she constructed a long mole to shelter Cenchreae, her Aegean port, and on the tip she placed a bronze statue of Poseidon.⁶³ The high promontory (3467 feet) on the western side of the Isthmus (Fig. 29), which guarded the approach to her harbor on the Corinthian Gulf, was crowned with a temple of



FIG. 21—Plan of Cnidus, built on the Triopium promontory and the adjacent island. Compare Figure 22. (From "Antiquities of Ionia," Part III, Society of Dilettanti, London, 1840.)

Hera Acraea.⁶⁴ The tip of this headland is now called Cape St. Nicholas, and its summit bears a humble chapel to that helpful saint.⁶⁵ Even the land-loving Spartans had their two ports of Gythium and Las, on the mountainous coast of the Laconic Gulf, protected by a promontory temple, one to Aphrodite and the other to Artemis Dictynna.⁶⁶ In like manner these headland sanctuaries clustered thick about the ancient ports of Alexandria, Byzantium, Syracuse, Naples, Carthage, New Carthage, and Gades.

ALONG THE TRACK OF THE GRAIN SHIPS

The second principle of distribution is revealed along the main trade routes of the Mediterranean Sea. The temples are found on all these "wet ways" along the coast where conflicting winds and currents meet and where the surf beats high. The long path of the Hellespontine wind, which blew from the Scythian coast of the Black Sea

⁶² Xenophon, *Hellenica*, II, 4 : 11.

⁶³ Pausanias, *op. cit.*, II, 2 : 3.

⁶⁴ Livy, *History*, XXXII, 23; Xenophon, *op. cit.*, IV, 5.

⁶⁵ Alfred Philippson: *Der Peloponnes*, Berlin, 1891, pp. 19-28.

⁶⁶ Pausanias, *op. cit.*, III, 22 : 1; Bursian, *op. cit.*, Vol. 2, p. 147.

down through the Bosphorus and Hellespont and swept southwestward across the Aegean, marked the great northern grain route of the ancient Mediterranean; hence it was punctuated by templed promontories. The high water level in the Black Sea in early summer, due to the great volume of the northern rivers, caused a strong current out through the Crimean Bosphorus and again through the Thracian Bosphorus and Hellespont into the Aegean. Ships northward bound to



FIG. 22—View of the site of the ancient city of Cnidus taken from a point in the peninsula westward of the entrance into the smaller harbor. Compare Figure 21. (From "Antiquities of Ionia," Part III, Society of Dilettanti, London, 1840.)

the Scythian grainfields had to sail up against the Hellespontine wind and also breast this current, which through the tortuous channels of the Straits rebounded from shore to shore and greatly complicated the problem of navigation. Hence the jutting banks of the Crimean Bosphorus had their sanctuaries to Artemis, Heracles, and Achilles.⁶⁷ Temples marked both headlands flanking the Euxine mouth of the Thracian Bosphorus; and halfway down the strait other sanctuaries capped the promontories of Hermes and Heracles, which received the violent impact of the current rebounding from the Asian side.⁶⁸ At the southern end, where northbound vessels met the full force of current and etesian wind, several temples marked the elbow of the Asian coast at Calchedon;⁶⁹ and the opposite headland of Byzantium was crowned by sanctuaries to Poseidon, Athene, Artemis, Aphrodite, and Heracles, all within three hundred yards of its hilly extremity, while altars of Achilles and the twin Dioscuri lay near the city of By-

⁶⁷ Pliny, *op. cit.*, IV, 26; Strabo, *op. cit.*, XI, 2 : 6-8; E. H. Minns: *Scythians and Greeks*, Cambridge, 1913, pp. 21-23.

⁶⁸ Polybius, *op. cit.*, IV, 39, 43, 44; Strabo, *op. cit.*, VII, 6 : 1.

⁶⁹ Xenophon, *op. cit.*, I, 3.

zantium.⁷⁰ This diverse group of deities represented the patron gods of the various seamen who frequented the busy port of the Golden Horn.

THE EUBOEAN SOUND ROUTE

The Hellespontine wind made perilous sailing at the entrance to the Malic gulf and the Euboean sound, where the rocky headlands

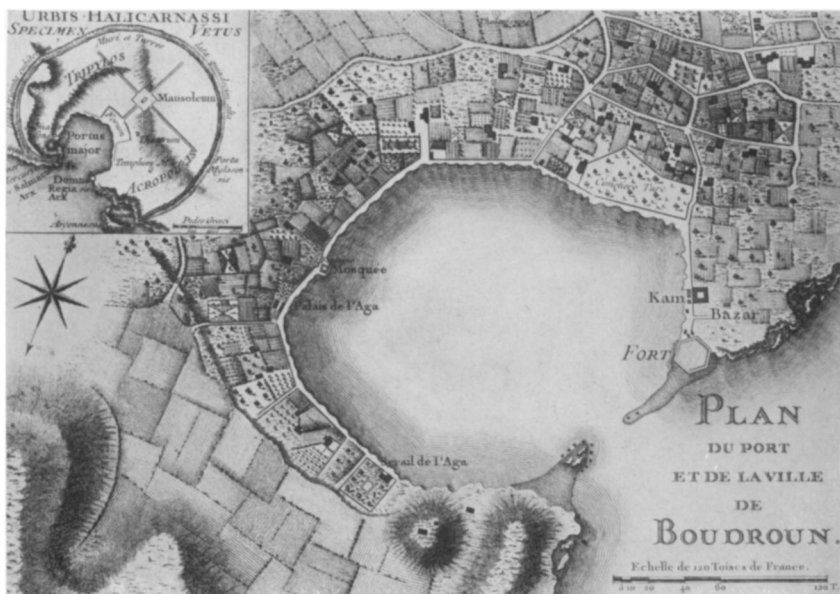


FIG. 23—Plan of the port of Budrum (Halicarnassus); inset, the ancient city. Compare Figure 24. (From Comte de Choiseul-Gouffier: *Voyage pittoresque de la Grèce*, Paris, 1782, Vol. 1.)

showed their teeth to approaching vessels. All these headlands therefore, were capped with temples or altars to Artemis, Thetis, Athene, and Zeus the Savior.⁷¹ The Euboean sound itself is protected from the Hellespontine blast by the long mountainous island of Euboea, which forms a breakwater and wind shield. But the Euripus or narrows of the sound, which contracts to two hundred feet between Aulis and Chalcis, was dreaded by ancient seamen because of the tidal rips which formed here and shifted four times in the twenty-four hours (Fig. 32); and also because of the squalls dropping from the high massif of Mt. Dirphys (5725 feet)⁷². With adverse winds and tide it was impossible to pass these narrows. Here under the lee of "Aulis rising high above the waves," was a little harbor where vessels were wont to await a change of wind and current.⁷³ In this port of refuge

⁷⁰ Pauly-Wissowa, article "Byzantion."

⁷¹ Sophocles, *Trachiniaiæ*, 238, 752-754, 993; Diodorus Siculus, *op. cit.*, XI, 12; Strabo, *op. cit.*, IX, 5 : 22; Apollonius of Rhodes, *op. cit.*, I, 568.

⁷² Livy, *op. cit.*, XXVIII, 6.

⁷³ Euripides, *Iphigenia in Aulis*, 122, 157.

Agamemnon and the Greek fleet, assembled for the campaign against Troy, were detained for weeks by head winds; and here finally, at the sanctuary of Artemis, Agamemnon sacrificed his daughter Iphigenia, that the goddess might facilitate their departure.⁷⁴ The altar of Artemis that crowned this little promontory became a place of sacrifice for later military ventures setting forth across the Aegean from the shores of Greece.⁷⁵ The pagan sanctuary has disappeared; the

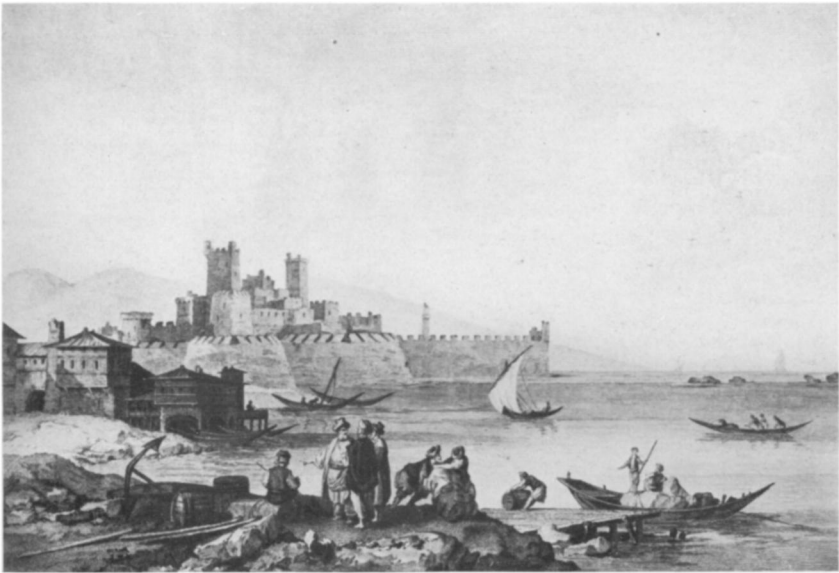


FIG. 24—View of the port and citadel of Budrum (Halicarnassus). Compare Figure 23. (From Choiseul-Gouffier, *Voyage*, Vol 1.)

perils to navigators have persisted; a little chapel to St. Nicholas watches here today over the fate of the seamen.

ROUNDING THE SOUTHERN PELOPONNESUS

The Hellespontine wind carried the current from the Hellespont southwestward across the Aegean. Side by side they swept around the southern end of Euboea and of Attica, where Poseidon from both rocky heights overlooked the stormy passage, and with undiminished force maintained their way southwestward to merciless Malea. This headland forms the eastern prong of the mountain trident of southern Peloponnesus, the other two being Taenarum and Acritas. All three flanked the course of vessels seeking Italy and the western Mediterranean, and all were buffeted by conflicting winds. Acritas on the west was swept by gales moving southward out of the Adriatic. All

⁷⁴ *Ibid.*, 90, 178, 350, 1450, 1540–1580.

⁷⁵ Xenophon, *op. cit.*, III, 4 : 3–4.

three at times were exposed to the southwest wind from Africa, and all knew the squalls sweeping down from the highland of Arcadia. They felt "the south wind warring with the north" described by Horace, the surf breaking on their hidden reefs, and the spume of the sea on their rocky fronts. Hence, besides the promontory sanctuaries, there were altars to Apollo Acritas, to the Malean Apollo, and to

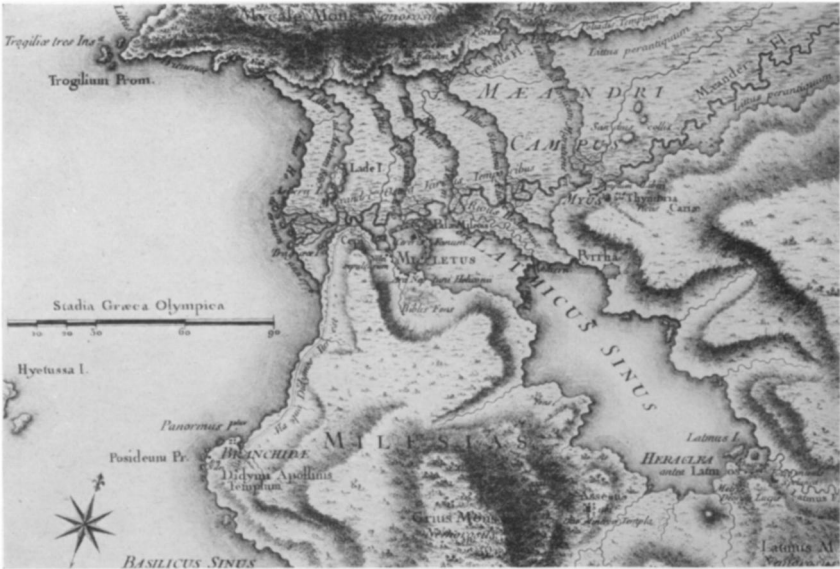


FIG. 25—Map of the vicinity of Miletus showing various stages in the silting up of the gulf between Miletus and Priene by the Maeander. Compare Figure 26. (From Choiseul-Gouffier, *Voyage*, Vol. 1.)

Taenarian Poseidon in the city of Sparta, where prayers preceded every Laconian venture on the deep.⁷⁶

But Malea was worst of all. "The blasts of whistling winds and swollen waves as huge as mountains," which drove the returning Menelaus south to Crete,⁷⁷ have continued to give the cape a bad name for storms and heavy seas through all time. The Spartan fleet that set out for Syracuse in the Peloponnesian War was caught by the Hellespontine wind off the cape and swept south to Africa. The fleet of Belisarius in 533 A.D., bound from Constantinople to Carthage, rejoiced to round Malea in calm weather.⁷⁸ Therefore the ancient seamen safeguarded themselves by establishing here four sanctuaries. A temple to Apollo Epidelios flanked the promontory on the east;⁷⁹ sanctuaries to Apollo,⁸⁰ Zeus, and Athene⁸¹ capped the bold spurs

⁷⁶ Pausanias, *op. cit.*, III, 12 : 5, 8.

⁷⁷ Homer, *op. cit.*, III, 287-290.

⁷⁸ Procopius, *De bello vandalico*, III, 13 : 5-7.

⁷⁹ Strabo, *op. cit.*, VIII, 6 : 1.

⁸⁰ Thucydides, *op. cit.*, VII, 26.

⁸¹ Pausanias, *op. cit.*, III, 22 : 10; 23 : 1.

of the cape itself, while from the summit of Cythera a temple to Aphrodite, or Astarte of Phoenician origin, looked down on the boisterous channel between island and headland (Fig. 11).⁸² The Parnon range, which tapers off southward to form Malea, is a ridge of bare, black limestone, 2600 feet high, dropping steeply to the surf at its base. A sheer cliff, 200 feet high, supports the last narrow ledge, on which are now two chapels and a hermit's cave.⁸³ Malea still retains its terrors.



FIG. 26—The ruins of Miletus and the course of the Maeander. Compare Figure 25. (From Choiseul-Gouffier, *Voyage*, Vol. 1.)

It overlooks a busy sea lane, dotted by the sails of sponge fishermen in quiet weather, as by the boats of the Phoenician purple gatherers in ancient times. Ocean liners plow past, oil tankers and grain ships from the Black Sea hold their course westward; but in stormy weather steamers and fishing smacks alike are held up for days.

The ancient east-west sailing route may be traced by these promontory temples, set up like milestones at every port of call, all the way from Cyprus past Crete and Malta to the Pillars of Hercules. When vessels left the shelter of the Asia Minor coast on their sunset voyage, they sailed along the leeward side of Rhodes past Lindus to escape the north wind; but they encountered it again till they succeeded in passing the templed promontory of Salmonium at the eastern extremity of Crete, a perennial point of danger.⁸⁴ Here the Apostle Paul met rough sailing on his voyage to Rome in the autumn of 40 A.D. His vessel found easy going along the sheltered southern coast of Crete and was lucky in having a gentle south breeze for rounding

⁸² Herodotus, *op. cit.*, I, 105.

⁸³ Philippson, *Der Peloponnes*, pp. 175-176.

⁸⁴ Apollonius of Rhodes, *op. cit.*, IV, 1693.

the templed promontory of Lissus,⁸⁵ because it was mid-October and far too late even for a grain ship from Egypt to be abroad in the Mediterranean. So the inevitable happened: the wind circled around to the northeast and the tempestuous Euroclydon, counterpart of the Italian bora, swept over the Mt. Ida range (8200 feet) of Crete into the Bay of Phaestus (modern Bay of Messara). It pounded Paul's



FIG. 27—Plan of ancient Syracuse. The city was situated on the island of Ortygia, which, connected with the mainland by mole and bridges, formed a promontory protecting the Great Harbor. Note the temples to Minerva and Diana. Compare Figure 28. (From T. S. Hughes: *Travels in Sicily, Greece, and Albania*, London, 1820, Vol. 2.)

vessel and drove him with the Greek crew for nine days westward to Malta.⁸⁶ It was generally an involuntary voyage, captained by the arbitrary god of the winds, that carried an ancient vessel across the open sea from Crete to Malta. These were dangerous waters. The promontory protecting the bay of Malta was crowned in Cicero's time by a temple of Juno, very ancient, very rich, and held in peculiar veneration;⁸⁷ and another headland was dedicated to Melkart from the early Phoenician appropriation of the island.⁸⁸

THE ISTHMIAN ROUTE TO ITALY AND SICILY

To avoid Malea and shorten the voyage between the Saronic and Corinthian gulfs, ancient passenger vessels and small freighters with

⁸⁵ Philostratus, *Life of Apollonius of Tyana*, IV, 34.

⁸⁶ Acts of the Apostles, 27 : 7-14.

⁸⁷ Cicero, *In Verrem*, V, 46.

⁸⁸ Ptolemy, *Geography*, IV, 3, 37.

valuable cargoes took the isthmian route across Greece, making the four-mile transit of the Isthmus by the diolcus, or roller tramway, maintained by Corinth. The importance of this passage, despite the isthmian tolls, is attested by the promontory temples flanking the route. Westbound vessels issued from the narrow Corinthian Strait between two temples of Poseidon, crowning the Rhium and Antirrhium promontories (Fig. 30),⁸⁹ and turned thence northward along the coast



FIG. 28—View of Syracuse. Compare Figure 27. (From "Atlante geografico e illustrativo della corografia dell' Italia," [Florence, 1845?], Vol. 4.)

past the dreaded Leucadian headland to Corcyra, whence they crossed the Strait of Otranto to Italy.⁹⁰ They struck land near Hydruntum (Otranto) where a temple of Mercury welcomed them from afar; or, sailing twenty miles farther south, they reached the promontory tip of Italy. Its summit was crowned by the temple of Athene Leucadia, which Aeneas saw on approaching the Italian shore.⁹¹ This spot is now occupied by the church of Santa Maria di Leuca, or the Madonna in Finibus Terrae. Only the platform of the old temple remains, but in the limestone cliff is a grotto containing ancient petitions of passing sailors to Jupiter Optimus.⁹²

From this point the vessels steered across the broad opening of the Gulf of Tarentum to the Lacinian promontory, site of a temple to Hera, who was apparently successor to an earlier goddess, native to the place. This was once the most hallowed temple of Magna Graecia

⁸⁹ Thucydides, *op. cit.*, II, 86; Pliny, *op. cit.*, IV, 3.

⁹⁰ Vergil, *op. cit.*, III, 275, 506-508; Thucydides, *op. cit.*, VI, 42-44.

⁹¹ Vergil, *op. cit.*, III, 530-532.

⁹² A. J. C. Hare: *Cities of Southern Italy and Sicily*, London, 1883, p. 326.

and held annually a great panegyric.⁹³ Today a solitary column, twenty-six feet high, rises from the massive substructure and gives the headland the name of Capo delle Colonne,⁹⁴ while near by is the church of the Madonna del Capo, to which young girls go barefoot in procession every Saturday. Fifteen miles to the south is a second promontory, once sacred to Castor and Pollux.⁹⁵ The destination of most Greek ships coming from the Gulf of Corinth was Sicily, whose



FIG. 29—View of Corinth from the citadel, looking towards the Gulf. The rocky promontory in the background runs from Mt. Gerania (on the right) westward to terminate in the headland now called Cape St. Nicholas. (From Stackelberg, *La Grèce*, Vol. 1.)

rich grainfields and pastures helped to supplement the meager food supplies of the old Greek cities. The eastern coast of Sicily was studded with templed promontories marking the entrances to the colonial ports,⁹⁶ while sanctuaries of Poseidon and Artemis on the Pelorus headland safeguarded the perilous Strait of Messina.⁹⁷

All three corners of triangular Sicily endangered navigation, and all were sites of famous temples. The Pachynum promontory at the south, *imbriferos Pachynos*, with its Apollo sanctuary was swept by north winds streaming down the Strait of Messina and also by south-west gales from the Atlas Mountains.⁹⁸ It was therefore the scene of frequent shipwrecks. The most famous promontory shrine of perhaps the whole Mediterranean capped the northwestern angle of Sicily, where the massive headland of Eryx rose to the height of

⁹³ Livy, *op. cit.*, XXIV, 3; Diodorus Siculus, *op. cit.*, IV, 24 : 7; Aristotle, *De mirabilibus auscultationibus*, 96.

⁹⁴ Hare, *op. cit.*, pp. 349-350.

⁹⁵ Pliny, *op. cit.*, III, 15.

⁹⁶ Thucydides, *op. cit.*, VI, 3; Cicero, *In Verrem*, IV, 53; Appian, *Bello civili*, V, 12 : 109.

⁹⁷ Diodorus Siculus, *op. cit.*, IV, 5, citing Hesiod; Strabo, *op. cit.*, VI, 1 : 5.

⁹⁸ Ovid, *op. cit.*, XIII, 725; Macrobius, *Saturnalia*, I, 17 : 24; Polybius, *op. cit.*, I, 37, 54.

2463 feet and made a second Malea.⁹⁹ On its level summit the early Phoenician colonists established their goddess Astarte and filled the grove about her temple with doves that figured in her worship. To the Greek colonists of Sicily she was Aphrodite of Eryx; she became Venus of Eryx when the Romans conquered the island and embellished her shrine.¹⁰⁰ At present her sanctuary site is occupied by the cathedral of Our Lady of Eryx, patron saint of the Sicilian sailors, Stella Maris of the Sicilian sea (Fig. 31). Hither pilgrims come from all parts of Sicily to make their offering for safe voyages, and they admire the doves which still wing their way from tree to tree in the surrounding grove. The sacred site has never changed, nor the human need; only the divine encumbent has assumed a different name and different guise.

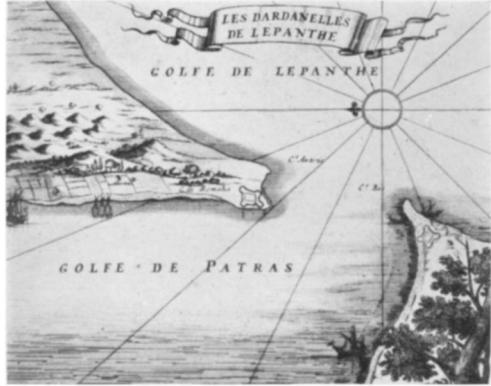


FIG. 30—Map of the Strait of Lepanto. The Venetian forts crowning the narrows, in antiquity the points known as Rhium (south) and Antirrhium (north), are on the site of temples to Poseidon. (From O. Dapper: *Naukewrige Beschryving van Morea*, Amsterdam, 1688.)

SACRIFICES TO PROMONTORY GODS

The promontory gods who were expected to rescue men from dire peril were appeased by offerings of cattle and even of human lives. Artemis in her more primitive forms was propitiated by human sacrifices, like that of Iphigenia at the temple of Aulis. This barbarous phase of her cult tended to appear as a heritage from Astarte, wherever the Tyrians established their factories or fishing stations. It characterized the sanctuary of Artemis on the Parthenium promontory of southwestern Crimea among the Taurii, who cast shipwrecked seamen from the cliff of the headland as offerings to Artemis of the deep;¹⁰¹ for the Taurii were fishermen and pirates, preying upon Greek vessels trading with the Crimean coast. The cult was either indigenous, belonging to a native Parthenia, or virgin goddess, on whom the Artemis worship was grafted; or it was borrowed from the Tyrians who maintained their purple-fishers' camp on the coast.¹⁰² Certainly it was not borrowed from the Greeks. In the drama of Euripides the translated Iphigenia, who officiated as priestess in the gloomy Parthenian temple,

⁹⁹ Polybius, *op. cit.*, I, 55; Vergil, *op. cit.*, V, 759-773.

¹⁰⁰ Freeman, *op. cit.*, Vol. I, pp. 277-280, 548-551.

¹⁰¹ Pomponius Mela, *op. cit.*, II, 3; Herodotus, *op. cit.*, IV, 103; Strabo, *op. cit.*, VII, 4 : 2; Pliny, *op. cit.*, IV, 26.

¹⁰² Euripides, *Iphigenia in Tauris*, 262-264.

voiced all the repugnance of the Hellenic mind to the barbarous features of the cult.¹⁰³

Yet similar features characterized the cult of Apollo on the Curias promontory in southwestern Cyprus, long under Phoenician influence. There anyone who touched the altar of the god was cast into the sea to



FIG. 31—Cathedral of Our Lady of Eryx on the Promontory of Eryx, successor of a temple of Astarte and of Venus of Eryx.

propitiate the deity.¹⁰⁴ But the most dramatic scene was yearly enacted at the temple to Apollo on the Leucadian promontory of southwestern Leucas (Fig. 6). The forces of air and sea multiplied the dangers of rounding this headland, which thrust out a rocky spur six miles in length and 2000 feet in height, rising in sheer cliffs of white limestone right across the path of the Adriatic winds. This was "the

¹⁰³ *Ibid.*, 34-41, 380-405.

¹⁰⁴ Strabo, *op. cit.*, XIV, 6 : 3; Thucydides, *op. cit.*, III, 94.

far projecting rock of woe," known and dreaded by ancient Greek and Roman sailors.¹⁰⁵ In order to avoid it the sand and boulder reef that connected Leucas with the mainland was pierced as early as 500 B. C. by an artificial canal. But waves and currents repeatedly barricaded the opening and forced vessels to round the Leucadian promontory. Here again the exigencies of the case demanded human sacrifices,

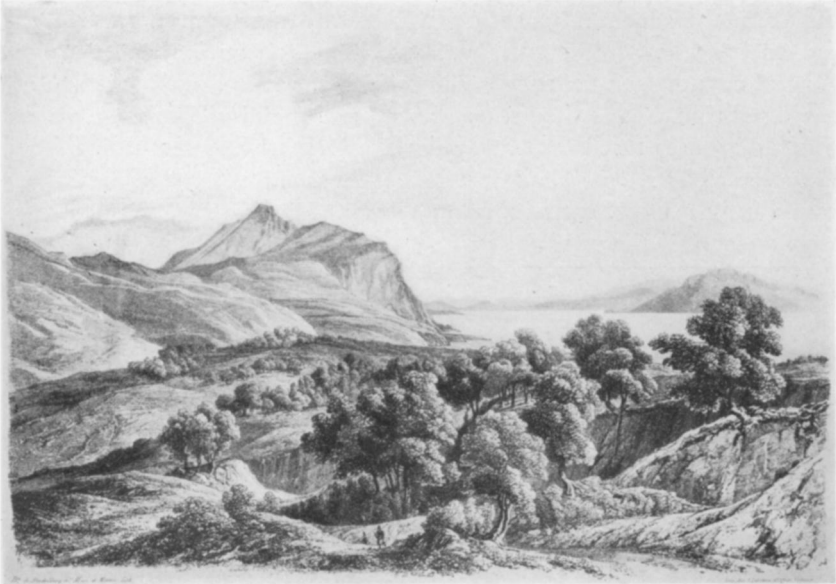


FIG. 32—The narrow and dangerous channel between Aulis and Chalcis. (From Stackelberg, *La Grèce*, Vol. 2.)

which evidently figured in the cult of the Leucadian Apollo from the gray dawn of history. Strabo gives us the story. Once a year on the feast day of the god a criminal who had forfeited his life was cast from the top of the cliff into the sea. But the moral refinement of a more cultured age raised a protest against the barbarity. Hence, before the victim was thrown over the cliff, he was provided with crude Dædalian wings and numerous doves were attached by strings to his person, in order that the fluttering of their pinions might break the force of his fall. Below on the water a group of expectant fishermen waited in their boats, ready to pick up the victim, if he should survive the fall, and carry him as an exile out of the country. One can imagine the scene—the bold, gleaming cliffs, the temple of Apollo on the summit, down below the white-winged fishing boats, with their sturdy sailors looking upward for the appearance of the victim, awe and fear and hope depicted on their countenances. But the Leucadian promontory was merciless in a storm; the god up there held no sinecure.

¹⁰⁵ Strabo, *op. cit.*, X, 2 : 8-9.

Though one hundred and seventy-five of these templed promontories have been identified, a few stormy headlands which by every law of geographical probability should have been sanctuary sites have not proved true to type. The Mt. Garganus promontory (3460 feet), the spur of Italy, though exposed to the dread bora sweeping down the Adriatic, held minor local shrines but none to a sea god. Notorious as Malea was Cape Caphereus "the Devourer," a rocky prong jutting out from the southeast coast of Euboea into the teeth of the Hellespontine winds. It was the graveyard of the ancient Aegean; its funeral chants sound through all classical literature.¹⁰⁶ But it had no saving shrine. Its evil genius was represented by Nauplius, whose misleading fires lured to destruction the Greek heroes returning from the siege of Troy.¹⁰⁷ The few who were washed ashore on Caphereus found only a cave, containing an altar and image of Dionysus, but they welcomed the warming gift of the god of wine.¹⁰⁸

¹⁰⁶ Euripides, *The Troades*, 90-91.

¹⁰⁷ Propertius, *Poems*, III, 7 : 39; Euripides, *Helena*, 1129; Ovid, *Tristia*, I, 1, 83; V, 7, 36.

¹⁰⁸ Pausanias, *op. cit.*, II, 23 : 1; IV, 36 : 6.



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ANCIENT MEDITERRANEAN AGRICULTURE*

PART I

BY ELLEN CHURCHILL SEMPLE†

GEOGRAPHIC CONDITIONS

Ancient Mediterranean agriculture had to adjust itself to a complex group of geographic conditions. It found a simple combination of climate, soil, and relief over a large area only in a few places like Egypt and the Po River Valley. In other districts the combinations were manifold within a small extent of country. Mountains dropped down to plains; a gravel-strewn soil bordered a fertile alluvium; a highland section of heavy rainfall sent down its streams to a semi-arid lowland; a limestone plateau, covered with a thin veneer of earth, overlooked a valley of deep rich soil; rainy winters alternated with long periods of summer drought, and the amount of the rainfall was unreliable. Agriculture was stimulated by the necessity of adjusting itself to these varied geographic conditions, and hence attained a precocious development which in many respects anticipated the best modern achievements.

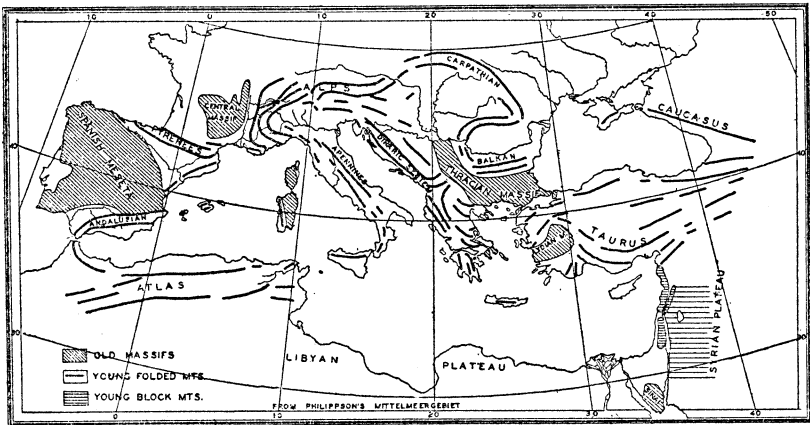
MOUNTAIN RELIEF

Owing to the prevailing mountain relief, the Mediterranean countries suffered from a paucity of level land adapted

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to tillage (see Map No. 1). Young folded systems with steep slopes, narrow valleys, and eroded canyons alternated here and there with old highlands of gentler slope. Coastal plains and interior lowlands were small and rare. Nearly the whole region was broken up into a series of narrow valleys opening out into deltaic flats, enclosed on three sides by hills or mountains. These were the garden spots of the Mediterranean. Here population concentrated, living off the produce of the small but fertile area, and securing its luxuries by sea-borne commerce. But population early



MAP No. 1. MOUNTAIN RELIEF—MEDITERRANEAN BASIN

outstripped the local means of subsistence. The home fields were compelled to produce more by improved methods of cultivation. Mountain-sides were terraced to extend the arable area. Retaining walls protected the new-made fields from erosion, and constant manuring kept up the fertility of these shallow shelves of land. On the durable valley fields every method was applied to increase the yield; repeated fertilization of the soil, careful tillage, intelligent selection of crops suited to climate and soil, importation of foreign seed and foreign plants, painstaking seed selection, all combined to constitute a precocious form of intensive tillage.

CLIMATE

Climate also was a potent factor in speeding up improved agricultural methods. The Mediterranean region is approximately a climate unit. It is a region of winter rains and summer droughts, of warm summers and mild winters (see Map No. 2). The annual precipitation as a whole is



MAP No. 2. ANNUAL RAINFALL—MEDITERRANEAN BASIN

moderate, but it varies greatly from one district to another (see Map No. 3). It declines from north to south, from highland to lowland, and from the west side to the east side of mountains, peninsulas and islands. It ranges from 60 inches or more on the Alpine slope near Trieste to 50 in Corfu, 27 in Patras, 21 at Candia in Crete, and 11 inches at Benghazi on the Cyrenaica coast of Africa.

It declines from 40 inches in Cephalonia on the west side of Greece, where the land lies exposed to the rain-bearing winds, to 16 inches in Athens 170 miles away on the eastern side but located in the rain-shadow of the Pindus Mountains; and it increases again to 26 inches in Smyrna on the west coast of Asia Minor.



MAP No. 3. SUMMER RAINFALL—MEDITERRANEAN BASIN

It is not the amount of the rainfall, however, but its marked seasonal distribution which characterizes the Mediterranean climate; and no appreciable change in this climate has occurred, in historical times, according to the evidence. The Mediterranean maritime region, however, includes several divergent climatic provinces. The Aegean and Black Sea give access to the Scythian plains (Russia) which get their rains (12 to 18 inches) chiefly in spring and

early summer in time for the spring wheat crop. The Po Valley, owing to its northern location and encircling mountains, gets its heaviest rains in autumn and spring, with showers through the summer. Egypt is a land apart, a fluvial oasis stretched across the African desert, innocent of rain beyond the Nile delta.

The Mediterranean climate, by reason of its sub-tropical temperatures, winter rains, and summer droughts, caused winter to become the chief season of tillage, and summer a period of relative rest. For the sown crops of winter, which were aided by the mild winter temperatures, the rains usually sufficed; but owing to the variability of the annual precipitation and to the uncertain duration and intensity of the long summer drought, the Mediterranean peasant had to adjust his tillage to the constant threat of inadequate rainfall. Hence he resorted to dry farming methods, which involved an alternate year of crop and fallow, elaborate plowing and working both of the fallow and the crop land, and careful discrimination in the use of soils, those which were dry and those which were retentive of moisture. The method of soil improvement resulting from this pressure of climatic conditions was a form of intensive agriculture.

The summer drought, which increased in length and intensity from north to south and from west to east in the long ellipse of the Mediterranean lands, necessitated irrigation for the cultivation of summer crops. These included many legumes, all vegetables, and also monsoon fruits which, in the course of time, were imported from the Orient and which required for their growth both heat and moisture. Irrigated tillage was also a form of intensive agriculture. It involved an expenditure of labor and capital in the construction of reservoirs and conduits; it necessitated frequent manuring of the irrigated fields which could be cropped all the year round; and it encouraged careful selection of seeds and plants in order to secure a fair return upon the valuable irrigated land. The mild winter temperatures of the Mediterranean region provided a long growing season which

repaid tillage and therefore was an incentive to increased effort. The only definitive checks upon the crops which might be raised were the amount of rain or available irrigation water and the quality of the soil.

SOILS

The ancient farmers recognized the importance of soils and distinguished many varieties. Interest in the quality of soil meets us in the earliest Greek literature. Odysseus, in the Isle of the Cyclops, observes that "the land might yield a very heavy crop and one always in season, for the subsoil is rich."¹ Homer in the *Iliad* speaks of "deep-soiled Troyland," "deep-soiled Thrace," "deep-soiled Phthia," and "goodly Elis,"²—a broad plain of loose Tertiary materials, overlayed by alluvium washed down from the Arcadian Highland. He knows "the fresh-ploughed field of rich tilth and wide," where "the upturned soil shows black."³ One would have enjoyed touring Greece with that observant poet before the light of his eyes went out. Herodotus sweeps Egyptian land with the discerning glance of a farmer; he describes the soil of the Nile flood plain as "black and crumbling as if it were mud and alluvial deposit, brought down by the river from Ethiopia; whereas we know that the earth of Libya is reddish and somewhat more sandy, and that of Arabia and Syria is more clayey and flinty."⁴ Libya and Arabia defined respectively the western and eastern borders of the Nile flood-plain, which alone constituted the Egypt of his time.

The ancients judged the fertility of soil by its color, according as it was black, dark, red, grey, or white; by its texture as fat or lean, heavy or light, dense and sticky or loose, compact or friable, gravelly, chalky or sandy, loamy or clayey; by its water content as wet, miry, moist, dry and

¹ *Odyssey*, IX, 136.

² *Iliad*, III, 73; XX, 485; IX, 328; XI, 685, 697.

³ *Iliad*, XVIII, 541-548.

⁴ Herodotus, II, 12.

parched; and finally by its natural vegetation.⁵ They recognized various combinations of these qualities, as light loose, warm soil or cold, dense, clayey soil or deep, rich, friable soil. At an early date they appreciated the value of mixed soils, in regard not only to fertility but also to mechanical composition. Theophrastus apparently questioning many of the two thousand students who attended his lectures in the Lyceum of Athens, summarized the agricultural practice which they had observed in their widely scattered native localities. "They tell us to mix contrasted kinds of soils, heavy with light and light with heavy; thin soil with rich, and also the red (*terra rubra*) with the white; and all contrasted kinds with rich soil. For the mixture not only remedies defects, but also adds strength, no matter what kind it was. If you will mix with another soil that which is exhausted and unsuited to grains, it will bear again as if renewed."⁶

The ancients distinguished soils also by their location in valleys, at the base of mountains, or on the middle or upper slopes;⁷ they recognized the relation of fertility and soil depth to the terrain, and therefore gave more manure to hillside fields than to valley land.⁸ Moreover, they sowed thickly or scantily according to the quality of the soil.⁹ "A fat good soil can bear heavier seeding than one which is sandy and light. However, they say that the same piece of land can take up more seed at one time and less at another time."¹⁰ Rainfall, snow, exposure, winds, dew, sun, and especially cultivation were all recognized as affecting the

⁵ Xenophon, *Oeconomicus*, XVI, 198; Herodotus, IV, 198; Theophrastus, *Historia Plantarum*, Bk. VIII, chap. ii, 8; chap. vi, 2-6; chap. vii, 5-7; Cato, *De Re Rustica*, 34; Varro, *Rerum Rusticarum*, Bk. I, chap. ix, 2-7; Columella, *De Agri Cultura*, Bk. I, chap. ii, 15; Bk. II, chap. ix; Vergil, *Georgics*, II, 177-258; Pliny, *Historia Naturalis*, XVII, 3, 4.

⁶ Theophrastus, *De Causis Plantarum*, III, chap. xx, 3.

⁷ Theophrastus, *Historia*, pt. II, chap. v, 7.

⁸ Columella, II, chap. v, 1; II, chap. x, 6.

⁹ *Leviticus*, XXVII, 16; Xenophon, *Oeconomicus*, XVII, 8-11; Columella, II, 9; Varro, I, chap. xlv, 1; Pliny, XVIII, 55.

¹⁰ Theophrastus, *Historia*, Pt. VIII, chap. vi, 2.

yield of the soil.¹¹ Xenophon found nothing more profitable than to buy poor neglected farm land, renovate it by judicious cultivation, and sell it at an increased price.¹² Pliny dissented from a current opinion that the land of Italy was worn out, although the deterioration of field agriculture in his time was generally acknowledged.¹³ As a matter of fact, these and other soils of the region have shown marked durability and powers of recuperation.

The soils of the Mediterranean region were in general young soils. They were allied in origin for the most part to the black earths of southern Russia. Conditions of climate and relief and the presence of wide-spread limestone formations combined to maintain the youth of these soils. The moderate or meager rainfall characteristic of large parts of the basin and its seasonal distribution tended to reduce the evil of leaching and hence to conserve the humus content of the soil. The limey constituents in the soil contributed to the same end by furnishing abundant supplies of calcium carbonate, which counteracted the natural tendency to acid formation and deflocculation; for a flocculated soil tends to preserve its fertility indefinitely. The limey content was constantly renewed from the underlying rock or it was supplied by the wash of earth on the ever present slopes. Moreover the prevailing mountain relief produced a slow rejuvenation of the soils by the steady transportation of fresh soil materials from the higher to the lower slopes, from mountain to piedmont, and from piedmont to valley or coastal plain. This process was accelerated by the erosive power of the wet weather streams, which carried off waste from the slopes and banks all the more effectively because the earth was baked and cracked by the summer drought.

The Tertiary terraces flanking many Mediterranean highlands consisted of weathered limestone, sandstone, marl,

¹¹ Theophrastus, *Historia*, Pt. VIII, chap. vii, 2, 6; IV, chap. iii, 7.

¹² Xenophon, *Oeconomicus*, XX, 22-26.

¹³ Pliny, XVII, 3.

and clay, veneered with alluvium. They therefore provided successive levels of deep arable soil extending far up the mountains. But numerous slopes of pure Cretaceous or Tertiary limestones were covered with only a thin mantle of earth. These furnished considerable areas of shallow soil, poor and arid, because the rain water percolated through the porous underlying rock; and where precipitation was heavy, as in the karst districts of Italy, Illyria, Greece, Epirus, and the summit of the Judean Plateau, these conditions combined to develop the *terra rossa* or *terra rubra* of the ancients, infertile red clays, from which all alkalies had been leached out and the scant humus content had vanished.¹⁴

MARITIME INTERCOURSE

Another factor indirectly encouraged ancient Mediterranean tillage. This was the enclosed sea which everywhere opened up avenues of communication and along these Greek and Phoenician colonists and traders carried improved methods of tillage from old cultural centers in the east to the pioneer regions of the west. Agricultural exchanges characterized the maritime commerce from earliest times. Import and export of foodstuffs figured equally in the trade of ancient Palestine and ancient Spain. The result was the practice of propagating new seeds and new plants from overseas lands. It was a trial and error method, but brought about a great diversification in the crops raised.

The ancient farmer learned by experience that climate and soil were big factors in the differentiation of fruits and grains; that a vine stock from Lebanon, for instance, gave a different grape on the slopes of Vesuvius or in the plain of the Rhone Valley. He became an experimental farmer, observing the results of every agricultural venture and drawing his conclusions accordingly. He was weak in theory but strong in practice. His methods were warranted to produce results, his result, the best yield possible for his particular

¹⁴ Glinka, *Typen der Bodenbildung* (Berlin, 1914), 62-68.

type of climate and of soil. Hence he watched his neighbors' crops and was guided by their experience.¹⁵ In our common parlance, he was a good "dirt farmer."

ANCIENT LAND UTILIZATION

Conditions of climate and relief gave rise to an elaborate system of land utilization. Plains were used for grain, hills for vineyards and orchards, mountains for forests and summer pasturage.¹⁶ Undrained land in deltaic swamps or water-soaked lowlands were reserved for wet meadows, where hay was mown or cattle were grazed in summer.¹⁷ Other undrained fields were planted to asparagus, to osiers and willows which provided material for baskets and wagon bodies.¹⁸ Rich, moist valley lands were reserved for wheat, flax, and cabbage;¹⁹ poor level soils were planted in various legumes which required little nutriment, like snail clover.²⁰ Red soil or *terra rossa* of the weathered limestone would yield good lupine and lentil crops.²¹ All ancient authorities stress the importance of selecting certain soils for certain crops. Limestone or crystalline rock slopes with thin stoney soil, like the hills of Judea and Caria, were suited for figs and olives. They produced small trees but excellent fruit.²² Mountain-sides of better soil, like volcanic ash overlying tertiary deposits of limestone and clay, were reserved for vineyards, which climbed the southward slopes up to 1000 feet or more, as on Mt. Massicus in Italy and Tmolus in Phrygia.²³

¹⁵ Xenophon, *Oeconomicus*, XVI, 3; Cato, *De Re Rustica*, VI, 1, 4; Varro, I, chap. xlv, 1.

¹⁶ Varro, I, chap. vi, 2-6; chap. xxiii, 1-4.

¹⁷ Ellen Churchill Semple, "Ancient Mediterranean Stock Raising," *Ann. Ass. Amer. Geog.*, XII (1922), 20-21, 30-31.

¹⁸ Cato, VI, 4; Cato, IX.

¹⁹ Vergil, *Georgics*, II, 203-225; Varro, I, chap. xxiii, 3.

²⁰ Varro, I, chap. xxiii, 2.

²¹ Cato, 34 and 35; Columella, II, 10; Pliny, XVIII, 36.

²² Theophrastus, *De Causis*, III, chap. vi, 6-8; Vergil, *Georgics*, II, 179-183; Columella, V, chap. x, 9.

²³ *Iliad*, III, 184; Strabo, XIV, 635; Vitruvius, III, 3; Vergil, *Georgics*, II, 97, 143; Pliny, XIV, 8, 9.

The base of a mountain range, where the land was enriched by the wash of the highlands behind, was considered the best site for a farm; here the soil was young and the fields were accessible to irrigation streams from the highlands, while the farm itself was protected from floods by its elevated site. A southward facing piedmont was the best.²⁴ Here the sun's heat was most effective by reason of insolation and the mountains behind warded off cold winds from the north, while air drainage protected orchards against untimely frosts. This was the general practice in the land utilization system of the ancients, but many exceptions to these rules were caused by local conditions of climate and soil.

SEASON OF TILLAGE

The distribution of rainfall made the mild Mediterranean winter the season of vegetative growth and the dry summer a period of rest, unless irrigation could supply the requisite moisture. Consequently for the ancient farmer, the winter half-year was preeminently the season of work. Most of the ploughing, harrowing, sowing, and planting had to be crowded into the ever shortening days between the autumn equinox and the winter solstice. The summer, after the early harvest in May or June, was the normal season of leisure. Hesiod, writing in the eighth century B.C., advised the Greek peasant to rest during the heat of the dog days and feast.²⁵ Therefore, ancient Mediterranean farm life, before the introduction of summer irrigated crops, presented a sharp contrast in its season of rural activity to the Tigris and Euphrates basins, where tillage depended upon the river floods caused by the spring and summer melting of the snows in Armenia; and it presented a like contrast to central and northern Europe, where the summer heat determined the season of tillage. But it accorded with Egypt, for the Nile floods, caused by the summer rains in the Highlands of Abyssinia, did not recede till autumn and therefore threw the big crops into the winter.

²⁴ Cato, I, 3; Varro, I, chap. xii, 1-3.

²⁵ Hesiod, *Work and Days*, II, 270-284.

FIELD AGRICULTURE CEREALS

The chief cereals of the Mediterranean Basin in antiquity, as today, were barley, wheat, and spelt (*zea*, *far*, or *ador*).²⁶ Rye and oats, essentially crops of northwestern Europe, were excluded in general from Mediterranean tillage because the climate was too dry. Rye was known to the ancient Greeks as a crop of Thrace and Macedonia,²⁷ whose northern location insured a heavier rainfall; and it was raised in the upper Po Valley in a mixed fodder crop.²⁸ Oats, known as a weed by Vergil, were a fodder crop fifty years later.²⁹

Autumn was the sowing season throughout the Mediterranean Basin; it was called "the seed-time" in Greece and Italy. "The yearly cry of the crane from the cloud," winging his way southward, was the sign of approaching winter with its rains, and warned the farmer that all hands "must plough and sow early and late, on wet days and dry, that the grain lands may be full," says Hesiod, and "a bounteous harvest come with the white blossoms of spring."³⁰ To delay this autumn labor was to invite disaster. On the Roman farm the fall equinox was "the time to urge on the belated ploughs, while the dry soil allows it, while the clouds hang aloft."³¹ The later advent of the autumn rains in Greece postponed the date of ploughing and sowing to October, and in Phoenicia and Palestine to November, when the first showers softened the soil preliminary to the heavy rains which began a month later. At the first sign of rain it was customary to "begin and sow the barley fields right into the showery skirts of frost-bound winter."³² Greater caution had to be exercised with the wheat, which required immediate showers for its germination, but no excess mois-

²⁶ Pliny, XVIII, 19; R. Gradmann, *Die Getriedebau in Deutschland im römischen Alterthum* (Jena, 1909), 32-39.

²⁷ Galen, VI, 514.

²⁸ Pliny, XVIII, 40.

²⁹ Vergil, *Georgics*, I, 77; Columella, II, chap. x, 32.

³⁰ Hesiod, *Work and Days*, 448-450.

³¹ Vergil, *Georgics*, I, 213-215.

³² Vergil, *Georgics*, I, 210-211.

ture; therefore it was sown after the barley, at successive intervals during the autumn to insure at least some yield.³³ In Greece, "all farmers look wistfully to the sky to see when the gods will send rain and allow them to sow." The rural maxim was: "Sow not on dry soil;" and the losses of impatient farmers pointed its moral.³⁴ In the eastern part of the Mediterranean Basin, where the growing season was short at best, the harvest was reduced or ruined if the autumn showers preceding the rains were tardy, or if the rainy season failed to end in late spring showers, which fortified the crops for their last period of growth. These were "the former and the latter rains" of the Bible for which the Hebrew farmer prayed.³⁵

The crops grew quickly through the warm humid autumn, slowly during the winter, but matured rapidly under the increased warmth of spring. "Abundant harvests come with abundant heat" is Vergil's generalization for Italy; and in Greece Hesiod tells the farmer "to gather the ripe grain, when the snail seeks the shade of a leaf to escape the heat of the sun."³⁶ The harvest fell in May or June, according to the locality, and had ideal conditions of warm, drying weather. The ripe crops were never jeopardized as in lands of summer rains.

Less common was spring wheat or "three-months wheat," so called because it matured in three months after sowing in March. It was grown in Alpine Italy, Thrace, Sicily, southern Euboea and Boeotia, and was known to yield a hard, heavy grain as opposed to the light, soft winter wheat, which however was generally preferred for food.³⁷ On the Scythian plains of the Black Sea, both kinds were raised: "the hard wheat crops are those of spring, the soft ones those of winter; for soft kinds are exceedingly light" says

³³ Xenophon, *Oeconomicus*, XVII, 4-6; Theophrastus, *Historia*, Pt. VIII, chap. vi, 1; *De Causis*, IV, chap. iv, 7.

³⁴ Xenophon, *Oeconomicus*, VII, 2.

³⁵ *Deuteronomy*, XI, 14.

³⁶ Hesiod, *Work and Days*, II, 260-262.

³⁷ Columella, II, chap. vi, 38; Pliny, XVIII, 12, 20.

Theophrastus.³⁸ The spring wheat of Thrace was attributed by the ancients to the severe winters of that northern region, though the lingering spring rains may have been a factor. The heavy Boeotian wheat was doubtless spring-sown, as it is today, on the margin of the Lake Copais basin when the winter flood waters gradually receded and Lake Copais contracted; the rich lacustrine soil and high water table explained the superior quality of the grain.³⁹

Millet and panic also were raised in various parts of the Mediterranean lands. As they required both heat and moisture, they found proper conditions in the irrigated fields of the Nile Valley and the Cilician lowland, where they were extensively cultivated.⁴⁰ In other districts they were planted at the vernal equinox, throve with a little irrigation, and matured after a short growing season. They were raised on a large scale as summer crops in the Scythian plains, in Campania of Italy, the northern part of the Po Valley and in southern Gaul,—all regions of summer showers or irrigation streams.⁴¹

LEGUMES

Besides cereals, several minor field crops which could stand the winter cold were planted in autumn and harvested in summer. But in the northern districts of the Basin, where the winters were rather severe but summers showery, and irrigation was easy, these were set out in the spring. Various legumes like lupines, beans, kidney-bean, various peas, chick-pea, vetch and lentils were usually sown in the autumn in Greece and peninsular Italy; but if they missed this seed time for any reason, they might be sown in the spring. Peas and lentils, which could ill endure the cold,

³⁸ Theophrastus, *Historia*, Pt. VIII, chap. iv, 5-6.

³⁹ Theophrastus, *De Causis*, IV, chap. ix, 5.

⁴⁰ Xenophon, *Anabasis*, I, chap. ii, 3.

⁴¹ Theophrastus, *Historia*, Pt. VIII, 3; *De Causis*, II, 7; Vergil, *Georgics*, I, 216; Columella, II, chap. ix, 17; Pliny, XVIII, 10, 24, 25, 66.

were usually spring sown.⁴² Vergil, whose principles of agriculture were reminiscent of his father's farm in the Mincio valley north of the river Po, advocated spring as the best seed time for beans, as frequent summer showers and abundant ground water provided all the moisture necessary, while irrigation was feasible at the critical blossoming time.⁴³ Sesame, like millet and panic, was a summer crop in both Greece and Italy and all three thrive best by irrigation.⁴⁴

Flax, which in time was widely cultivated, required a rich moist soil, which it was known to exhaust.⁴⁵ Soil, therefore, was the chief factor in its distribution. It was raised in Egypt for linen from the earliest times; in Palestine before and after the Jewish conquest,⁴⁶ where owing to its exhausting effects on the soil, tenants' contracts permitted it to be sown only once in seven years.⁴⁷ It flourished in the alluvial plain of the Phasis River in the land of Colchis, where Herodotus surmised that the culture had been introduced by Egyptian colonists.⁴⁸ It was known in Homeric Greece only by the imported fiber; later fine crops were grown in the fertile Tertiary plain of Elis,⁴⁹ but in general the climate and soil of Greece were too dry.⁵⁰ Flax was raised extensively in the Po Valley and the east coast of Spain where it gave rise to a finished linen industry.⁵¹ It was sown in spring in northern Italy and probably in Colchis where summer rains were bountiful; but in autumn in Egypt and other semi-arid lands of the Eastern Mediterranean. The

⁴² Theophrastus, *Historia*, Pt. VIII, chap. i, 3-4; chap. vi, 5; Pliny, XVIII, 30, 31, 33, 36, 37.

⁴³ Vergil, *Georgics*, I, 214-216.

⁴⁴ Theophrastus, *Historia*, Pt. VIII, chap. i, 1; chap. vii, 3; Pliny, XVIII, 22.

⁴⁵ Theophrastus, *De Causis*, IV, chap. v, 4; Columella, II, chap. x, 17.

⁴⁶ *Joshua*, II, 6; *Hosea*, II, 9.

⁴⁷ H. Vogelstein, *Die Landwirthschaft in Palastina zur Zeit der Mishnah* (Berlin, 1894), 50.

⁴⁸ Strabo, XI, chap. ii, 17; Herodotus, II, 105; IV, 74.

⁴⁹ Pausanias, V, chap. v, 2; VI, chap. xxvi, 4.

⁵⁰ H. Blummer, *Griechische Privatalterthümer* (Freiburg, 1882), 107-108.

⁵¹ Pliny, XIX, 2.

fiber was used for various grades of linen, and the flaxseed for food both in Greece and Italy.⁵²

DRY FARMING

The annual rainfall in most Mediterranean lands usually sufficed for the winter crops, but owing to wide variations in amount and in duration of the rains, tillage early developed dry-farming methods. Records of recurrent drought and famine meet us in the ancient history of Palestine, Syria, Cyprus, Crete, Asia Minor, Greece, Cyrenaica and Italy. These were often due to curtailment of the growing season. Amos makes Jehovah say: "I have withholden the rain from you when there were yet three months to the harvest."⁵³ This meant cessation of the rains in February and consequent death to the standing grain. Modern precipitation records of Jerusalem tell the same story. The "former rains" may begin any time between October 4th and November 28th, the first date promising a long growing season with timely germination of the seed in a warm soil, and the latter a short season and imperfect germination in ground chilled by winter cold. Moreover, the "latter rains" may cease any time between April 1st and May 27th, the former date meaning imperilled crops and the latter a full harvest. Italy, in 1922, lost so much of her wheat harvest, because the rains stopped early in May before the grain was filled out, that she had to lift the import duty on wheat. The amount of the rainfall is equally unreliable. At Jerusalem it fluctuates between 13 and 43 inches from a mean annual of 26 inches; at Athens, between 4.5 and 22.5 inches from a mean annual of 16 inches; in the Tunisian or Carthaginian district, between 13 and 26 inches from a mean annual of 17.75 inches; at Syracuse between 10 to 43 inches from an average 25 inches.

⁵² Thucydides, IV, chap. xxvi, 8; Pliny, XIX, 3.

⁵³ *Amos*, IV, 7.

PLOUGHED FALLOW

These fluctuations are recognized by modern climatologists as normal phenomena on the margin of the arid belts; and they were taken into account by the ancient farmers. Dry farming methods were developed to a surprising degree, in Palestine and Greece in the 9th century B.C. or even earlier. Fields were regularly allowed to lie fallow in alternate years.⁵⁴ The effect was not only to rest the land, but also to accumulate in the soil a whole year's supply of moisture for the next crop. To accomplish this end, the idle field was kept constantly under cultivation; for working the fallow removed weeds and rendered the soil lighter and moister.⁵⁵ Three ploughings were considered imperative, and a fourth or even fifth was advocated. Hesiod calls the fallow "the guardian against death and ruin."⁵⁶ He mentions "a thrice-ploughed fallow in the fertile land of Crete."⁵⁷ Homer frequently mentions "the thrice-ploughed fallow," which seems to have been the early standard.⁵⁸ For the thin dry limestone soils of Palestine, the Hebrew Proverbs advise a fourth or mid-winter ploughing: "The sluggard will not plough by reason of the winter; therefore he shall beg in harvest."⁵⁹ Besides the three ploughings between spring and fall, Theophrastus advocates winter ploughing for light dry soils in order to enrich and moisten them.⁶⁰ Theocritus observes it was the custom in ancient Elis to "sow the seed in fallow land thrice, aye, four times broken by the plough."⁶¹ Italy's best practice was the same: "That field yields best which twice has felt the summer's

⁵⁴ Vergil, *Georgics*, I, 71-72; Varro, I, chap. xlv, 3; Pliny, XVIII, 49.

⁵⁵ Theophrastus, *De Causis*, III, chap. x, 1; Xenophon, *Oeconomicus*, XVI, 11-15.

⁵⁶ Hesiod, *Work and Days*, 464.

⁵⁷ Hesiod, *Theogony*, 971.

⁵⁸ *Iliad*, XVIII, 542; *Odyssey*, V, 127; *Odyssey*, XIII, 32.

⁵⁹ *Proverbs*, XX, 4.

⁶⁰ Theophrastus, *De Causis*, III, chap. xx, 2, 6-7; *Historia*, Pt. VIII, 5.

⁶¹ Theocritus, *Idyl* 25.

heat and twice the winter's cold."⁶² Pliny advised five ploughings for dense soils; nine were needed to break up the hard clay land of Etruria.⁶³ The ancients regarded the fallow as a means of accumulating all the resources of the soil, of which water was "the chief aliment."⁶⁴ "Fruitful fields in turn now yield to man his yearly bread upon the plains, and now again they pause, and gather back their strength," says Pindar.⁶⁵

The fields destined for fallow were ploughed first in September in time to catch the autumn showers; the second time in mid-winter to make the soil hospitable both to the winter rains and to the frost; the third time in spring before the last showers of the rainy season; and a fourth time in mid-summer.⁶⁶ This last ploughing, which was emphasized by all ancient authorities, had the effect of breaking up the surface enough to prevent loss of moisture by capillary attraction; it was rarely followed by harrowing. The standard was a bare, clean fallow. A field overgrown with thorns and weeds proclaimed the owner a slothful man, void of understanding, indulging in "a little sleep, a little slumber, a little folding of the hands to sleep," but destined to bitter poverty.⁶⁷ Xenophon urges ploughing in spring and repeatedly during the summer, in order to eradicate weeds and turn up the fallow to the sun.⁶⁸

CHARACTER OF THE PLOUGHING

Ploughing moreover had to be thorough. Theophrastus and Cato considered it the essence of good tillage.⁶⁹ The first

⁶² Vergil, *Georgics*, I, 42-49; Compare Theophrastus, *De Causis*, Pt. III, chap. xx, 6-7.

⁶³ Pliny, XVIII, 49; Pliny the Younger, *Letters*, V, 6.

⁶⁴ Pliny, XIX, 59; Theophrastus, *Historia*, Pt. IV, chap. iii, 7.

⁶⁵ Pindar, *Nemean Odes*, VI, 10-12.

⁶⁶ Varro, I, chaps. 29-32.

⁶⁷ *Proverbs*, XXIV, 30-34; *Hosea*, X, 12; *Jeremiah*, IV, 3.

⁶⁸ Xenophon, *Oeconomicus*, XVI, 12-14.

⁶⁹ Cato, 61; Theophrastus, *De Causis*, III, chap. x, 6.

furrows were run in straight lines and others were drawn obliquely across these to level the ridges.⁷⁰ A field was considered well ploughed when it was scarcely possible to detect in which direction the share had last gone.⁷¹ Moreover, all clods were regularly broken up with the mattock, rake or hoe,⁷² till no harrowing was necessary for the summer fallow or even for the sown field in autumn except to cover the seed, according to most authorities. Varro and Columella advise harrowing only in case of poorly tilled land.⁷³ On hillsides, furrows were drawn horizontally in order to prevent washing and to hold the moisture for the plant roots.⁷⁴

The depth of the ploughing was determined by the nature of the land. In Syria and Palestine, where the underlying rock came near the surface, the native farmers used small ploughshares which made a shallow furrow, "lest the earth burnt by the sun, refuse a crop."⁷⁵ The Greeks appreciated the value of deep culture. It was customary in Megara every five years to dig down deep and turn up the subsoil as far as the water penetrated, because the rain carried the fertile elements down beyond the reach of the roots. The peasants of the rich lake plains of Thessaly had a digging implement called a *mischum* which did the work of a subsoil plough, turning up the earth from a considerable depth.⁷⁶ The comment of Ulysses on the subsoil of Sicily suggests that even the Homeric Greeks may have practised deep cultivation. The Romans considered that grain land had to be rich and well tilled for two feet down, not merely on the surface. Hence the fallow was ploughed deep, in order that the roots of the crop might readily penetrate.⁷⁷

⁷⁰ Vergil, *Georgics*, I, 9.

⁷¹ Varro, I, 9; Columella, II, 4-5.

⁷² *Hosea*, X, 11; *Isaiah*, XXVII, 24-25; Vergil, *Georgics*, I, 164; Varro, I, 29, 2.

⁷³ Columella, II, 5.

⁷⁴ Pliny, XVIII, 49.

⁷⁵ Pliny, XVII, 3; Theophrastus, *De Causis*, III, chap. xx, 5.

⁷⁶ Theophrastus, *De Causis*, III, chap. xx, 4, 8.

⁷⁷ Columella, II, 2, 23.

Deviation from this alternate fallow system was considered permissible only when the winter grain crop was followed by a winter legume crop, which after an early harvest was turned under as a green manure.⁷⁸ But this three-field system had to be applied with caution. On a farm of 200 *jugera*, 100 *jugera* were sown in autumn; if a spring crop was raised, it was limited to 30 *jugera* so that nearly half of the land remained fallow. Only very rich, moist, volcanic soils, like those in the Neapolitan district where the ground water was high, were cropped every year.⁷⁹

The fallow system persists in modern Greece. "Grain or fallow" or "grain or forage crop" describes the use of farm land there today, even in the excellent sandy loam of the Marathon plain.⁸⁰ In the Peloponnesus, the cropland lies fallow every second or third year, except in a few very fertile districts which are irrigated for gardens and currant plantations.⁸¹

YIELD PER ACRE

The yield per acre was moderate, despite all efforts at soil improvement through tillage and fertilization. Herodotus and Pliny cite returns of a hundred fold or more, but these were obviously exaggerations. The same applies to the sixty and thirty fold of the Bible, an impossible yield even for the scant sowing practised then as today on the poor soil of the Judean Plateau. According to reliable authorities, the maximum return known in Roman Italy about 50 B.C. was eight to ten fold. This was the yield of winter wheat from rich volcanic soils in eastern Sicily, and it amounted to 20 or 24 bushes to the acre.⁸² A yield of

⁷⁸ Varro, I, 44; Theophrastus, *Historia*, Pt. VIII, chap. i, 4; *De Causis*, III, chap. xx, 7.

⁷⁹ Strabo, V, chap. iv, 3.

⁸⁰ Cyrus Hopkins, *Univ. Ill. Agri. Exp. Sta. Bull.* 239, Tables on pages 442, 444, and 456.

⁸¹ A. Philippson, *Der. Peloponnesus* (Berlin, 1892), 540, 561-562.

⁸² Cicero, *In Verrem*, III, 47, 116.

fifteen fold or 36 bushels of wheat to the acre was quite extraordinary and restricted to a few favored spots.⁸³ Old Cato, who a hundred years earlier tilled a farm of average soil in the Sabine hills near Rome, was content with five fold, which meant 10 bushels of wheat or 12 bushels of barley to the acre. This average fell to 8 bushels of wheat or less in the time of Columella (60 A.D.), when field tillage declined in Italy owing to excessive competition of foreign grain.⁸⁴

ORCHARD AND VINEYARD CULTURE

Hardly less important than field agriculture was the orchard and vineyard culture of the ancient Mediterranean world. Every farm normally combined both branches of tillage in order to provide its own bread, olive oil and wine. This was the rule from the earliest times. To the ancient Jews, vineyards and orchards were essential features of sedentary agriculture as opposed to pastoral nomadism.⁸⁵ Every son of Israel wanted to sit under his own vine and his own fig tree.⁸⁶ Solomon purchased building materials for the Temple with wheat, oil and wine, all products of Palestine.⁸⁷ Grain fields, vineyards and orchards characterized the princely estates of the Homeric age in Greece.⁸⁸ Each farm, each district was practically self-sufficing.

But as maritime trade developed, as centers of population increased in size and multiplied, natural grain regions like Egypt and the Scythian plains became the dominant sources for bread-stuffs, though every small district and especially inland localities maintained some cereal culture against emergency times of war and piracy, when oversea supplies of grain became unreliable. With the curtailment of home-grown wheat fields, orchard and vineyard culture spread.⁸⁹

⁸³ Varro, I, 44; Pliny, XVIII, 55.

⁸⁴ Columella, III, 3-4.

⁸⁵ *Jeremiah*, XXXV, 6-10.

⁸⁶ *I Kings*, IV, 25; *Isaiah*, XXXVI, 16.

⁸⁷ *II Chronicles*, II, 10, 15.

⁸⁸ *Iliad*, XVIII, 564-565; *Odyssey*, XXIV, 241-246; Hesiod, *Work and Days*, II, 250-254.

⁸⁹ Suetonius, *Augustus*, 42; *Domitian*, 7.

From the time of Solon, Attica was famous for its olive groves, the only remunerative crop on that poor limestone soil; Lesbos and Chios were noted for their vineyards. In the last decades of the Roman Republic, Italy looked like one great orchard,⁹⁰ while its mountains were mantled in vineyards. These branches of tillage yielded a big profit. They increased in regions of dense population or small arable area, where large returns from the soil were imperative. Such were the islands of the Aegean Sea and countless mountain-rimmed valleys, like that of Sparta. Certain localities, adapted by soil and climate to superior varieties of fruit or vine, specialized accordingly.

Ancient farmers made a radical distinction between sown and planted crops.⁹¹ The latter were assigned to the hills, but were developed by close adaptation to conditions of prevailing winds, soil, exposure and air drainage. Their place in the complex system of land utilization was formulated in 313 B.C. by the Greek Theophrastus, but the practice was centuries older. Theophrastus says: "Use your rich soils for grains and thin soils for trees. Grains and all other annuals take the nutriment from the surface soil, which therefore ought not to be thin or of a quality to be quickly exhausted, as happens in a shallow layer of earth. But trees, equipped with long and strong roots, draw their nourishment from the depths. In rich soils, trees run to wood and foliage, but yield little or no fruit. Hence a thin soil is superior from both standpoints; it produces a balanced foliage and fruitage."⁹² But this lean hillside soil required constant spadework to render it permeable by the roots, and manuring to provide plant food for the trees.⁹³

The olive, fig, and vine, held a conspicuous place in ancient Mediterranean tillage. They seem to have been indigenous throughout the region, as they were equipped by nature to

⁹⁰ Varro, I, chap. ii, 6.

⁹¹ Xenophon, *Hellenica*, III, chap. ii, 10; Cicero, *De Re Publica*, V, 2.

⁹² Theophrastus, *De Causis*, II, chap. iv, 2-3.

⁹³ Theophrastus, *Historia*, Pt. II, chap. viii, 1.

withstand the summer drought; but their intensive cultivation, by which wild forms were domesticated and superior varieties were produced, spread from the eastern to the western end of the basin through the distributing agencies of trade and colonization. Vines and olive and fig trees survived the summer drought by reason of their elaborate root systems which penetrated down to the moisture conserved in the deeper layers of soil, and moreover spread out widely to gather in the maximum amount of moisture during the rainy season. The olive figured large in the domestic economy of the ancients. Its oil supplied the place of butter which was excluded by the poor pasturage of the Mediterranean lands, and it furnished the chief ingredient in the unguents and ointments for the skin which the strong dry winds of the Mediterranean summers made a necessity. Bread, oil, wine, figs, and grapes, eaten either fresh or dried as raisins and fig cakes, formed staple articles in the ancient Mediterranean diet. Wine was the universal beverage except for the beer used in Egypt and the mead consumed by the retarded mountaineers of central Spain.⁹⁴

Orchards and vineyards flowered in early spring and produced their fruit in late summer or autumn. In ordinary seasons, they weathered the summer drought without irrigation, but in semi-arid regions or in especially dry years they demanded some artificial watering. Egypt, which is a special province of the Mediterranean region both from the climatic and physiographic standpoint, produced fruit trees and vines only by irrigation.⁹⁵

NURSERY BEDS

Everywhere in the Mediterranean region these plants had to begin their life in nursery beds in order to develop an adequate root system, their prime requirement, before they should be set out in the fields. These nursery beds were

⁹⁴ Diodorus Siculus, V, 34.

⁹⁵ Xenophon, *Oeconomicus*, XIX, 3-10, Pliny, XVII, 14, 16; Vergil, *Georgics*, II, 348ff.

carefully prepared. Generally a trench was dug two or three feet deep and about as wide; stones or boulders were placed at the bottom for drainage, and covered with soil enriched with the proper kind of manure. The soil of the nursery bed and its exposure both to sun and prevailing winds was similar to that of the field into which the young trees or vines should be transferred,⁹⁶ "lest a sudden change of mother estrange the young plant," says Vergil. Shoots selected for propagation were the best varieties which could be found adapted to the local soil and climate.⁹⁷ They were irrigated morning and night until they had made a good start, and thereafter they were tended two to five years before being transplanted. Then they were removed with great care and rapidity to avoid mutilation of the roots and to prevent their getting dry.⁹⁸ Months or even a year before this important operation, holes were dug in the orchard or vineyard deeper than the trench of the nursery bed in order to facilitate the downward growth of the young roots.⁹⁹ Moreover, the young plant was then set out in the field with its south side indicated by a chalk mark, facing south, and its back to the north,¹⁰⁰ because, says Vergil, "So strong is the habit of infancy."¹⁰¹ Vine stocks and trees set out in a rich plain were placed close together, because the abundant fertility of the soil would support the close planting;¹⁰² but on the thinner soils of hillsides or mountains, they were given more room.¹⁰³

Olive and fig trees were known to have especially wide-spreading roots.¹⁰⁴ For this reason, a law in ancient Attica prohibited a farmer from planting these trees within nine

⁹⁶ Cato, 45, 46, 48; Theophrastus, *De Causis*, III, chap. vi.

⁹⁷ Theophrastus, *Historia*, Pt. II, chap. v, 1.

⁹⁸ Cato, 28, 45.

⁹⁹ Mago quoted, Pliny, XVII, 16; Cato, 43; Columella, V, 10.

¹⁰⁰ Theophrastus, *Historia*, Pt. II, chap. v, 1.

¹⁰¹ Vergil, *Georgics*, II, 272.

¹⁰² Vergil, *Georgics*, II, 274-277.

¹⁰³ Theophrastus, *Historia*, Pt. II, chap. v, 6.

¹⁰⁴ Theophrastus, *De Causis*, III, chap. iv, 2; *Historia*, Pt. II, chap. iv, 6; Palladius, IV, 10, 25.

feet of his neighbor's boundary line, lest the roots should encroach upon the next estate.¹⁰⁵ The interval between olive trees in Italy measures from twenty-five to thirty feet according to Cato,¹⁰⁶ but the distance varied elsewhere according to the locality. Mago of Carthage prescribed an interval of seventy-five feet each way between the olive trees, or of forty-five feet where the soil was poor and exposed to winds.¹⁰⁷ This wide spacing undoubtedly reflected the low rainfall—10 to 14 inches—in the coastal plan of Tripolis, a region long famous for its olive groves, and in Mago's time (500 B.C.)¹⁰⁸ already in the Carthaginian sphere of influence. The trees there and also in the Atlas coast valleys were very large, because the oil was rich and ground water high. They were large also and widely spaced in the orchards of the Guadalquivir Valley; but there the interval may have been due to fertile soil and low rainfall, or to leave room for the grain crops regularly sown in the olive groves. The reach of the branches was considered the proper guide for the spacing.¹⁰⁹ The interval between pomegranates and myrtle was at least nine feet, and more for apples, pears, almonds and figs. Declivities required smaller intervals between the trees because the spread of the branches was less.¹¹⁰ On windy sites it was found advisable to plant the trees close together for protection.

PRUNING

It was a general principle, recognized by Theophrastus and other writers, that barren trees lived longer than fecund ones, and those bearing scant fruit than those yielding much.¹¹¹ The cultivation of the orchard, however, aimed at

¹⁰⁵ Plutarch, *Solon*, 23.

¹⁰⁶ Cato, VI, 2.

¹⁰⁷ Mago, quoted, Pliny XVII, 19.

¹⁰⁸ J. P. Mahaffy, "The Work of Mago on Agriculture," *Hermathena*, VII (London, 1890), 29-35.

¹⁰⁹ Pliny, XVII, 17.

¹¹⁰ Theophrastus, *De Causis*, III, 8.

¹¹¹ Theophrastus, *De Causis*, II, chap. xi, 1-3.

production of fruit, and not at the vigor of the tree. To achieve this purpose the ancients developed an elaborate system of pruning, thereby diverting the nutriment of the tree into the fruit. It was usual to keep the tree low and compact, since a tall growth involved waste of nutriment.¹¹² But in starting the young tree on its life course, climatic conditions forced the consideration of the woody growth until the tree was established. Experience taught that autumn pruning encouraged the vegetative growth and and spring pruning the development of fruit. Hence it was the rule to prune the poor, meagre vine in the autumn and the strong healthy vine in the spring. Moreover, the vine quicksets were cut down almost to the ground at the end of the first year and again at the end of the second year in order to develop roots and to encourage vigorous branching.¹¹³

The application of this principle meets us in Palestine among the Jews, who probably learned it from the resident Canaanites, a people already advanced in agriculture. The Bible instructs the Jews to plant all kinds of fruit trees but forbade them to eat the fruit of the tree till the fifth year of its growth. For the first three years, the yield was declared unclean; that of the fourth year was sacrificed in the Temple, but that of the fifth might be eaten.¹¹⁴ The effect of this religious taboo was to discourage all pruning for fruitage and to encourage pruning for tree growth. The experience of American farmers in the interior of Washington teaches that hot, dry summers with intense sunlight stimulate premature fruiting.¹¹⁵ This evil under similar climatic conditions in ancient Palestine was checked by autumn pruning. But the orchards once established were made to give as large a crop as possible, because of the relative

¹¹² Theophrastus, *De Causis*, II, chap. xii, 6; *Historia*, Pt. II, chap. vii, 2.

¹¹³ Pliny, XVII, 35.

¹¹⁴ *Leviticus*, XIX, 23-25; Josephus, *Jewish Antiquities*, IV, chap. viii, 19.

¹¹⁵ L. H. Bailey, *The Pruning Book* (New York, 1914), 182, 185, 188.

paucity of good arable land and gentle slopes. The Bible forbade the Jews to destroy olive trees in war time, either wantonly or to use the wood in besieging a city, because they were an asset for the conquerors.¹¹⁶

GRAFTING

The chief problem in the ancient Mediterranean orchard was to get the root system of a tree established. Young trees with shallow roots were at a disadvantage unless they were accessible to irrigation streams; but artificial watering often impaired the quality of the fruit. Hence grafting early became a feature of ancient fruit culture. A tree once established with a strong root system, such as wild olive, wild pear or wild apple, could be utilized by a fine grafted shoot.¹¹⁷ According to Theophrastus, it was thus possible to upset the laws of nature, since the vine-dresser could produce black, white, and red bunches on the same shoot and could develop seedless grapes.¹¹⁸ Experience also taught the ancients that grafted branches gave a yield true to type, while seedlings tended to revert to the wild variety or bear inferior fruit.¹¹⁹ Grafting enabled the farmer to render barren trees productive and to introduce superior varieties.

OLIVE ORCHARDS

A large proportion of the orchard land apparently was devoted to olives. This was true in ancient as in modern times.¹²⁰ Pliny mentions fifteen varieties of olives, distributed from Syria to central Spain and from the base of the Alps to Africa. Italy raised the best fruit; Istria and

¹¹⁶ *Deuteronomy*, XX, 19.

¹¹⁷ Aristotle, *De Plantis*, I, 6; Cato, 40-42, 45; Varro, I, 40; Columella, V, 2, 8.

¹¹⁸ Columella, *De Arboribus*, IX; Theophrastus, *De Causis*, V, chap. iii, 1.

¹¹⁹ Theophrastus, *Historia*, Pt. II, chap. ii, 4-6; *De Causis*, II, 24.

¹²⁰ For Italy and Spain, *International Year Book of Agricultural Statistics* (Rome, 1922), Tables 38, 39; for Greece, *Report on the Industrial and Economic Situation in Greece* (London, 1927).

the Guadalquivir valley of Spain (Baetica) ranked next. Roman Africa "has been all but deprived of oil and wine," because both climate and soil were better adapted to grain production.¹²¹

Olive trees thrive on a dry calcareous soil like that of Attica or Judea, or on a tenacious clay covering a slope, or on a mixture of clay and sand with a gravelly sub-soil.¹²² Drainage was imperative. "Stubborn land and ungracious hills, fields of lean marl and pebbly brushwood welcome the long-lived groves of Pallas Athene," says Vergil,¹²³ speaking from the standpoint of the Alpine piedmont with its ample rainfall. Cato and Varro, familiar with the dry summers of Latium, advocate a dense warm soil for eight specified varieties of olive trees.¹²⁴ In the Guadalquivir Valley, with a fifteen inch rainfall, the orchards needed rich soil to retain moisture; but they yielded an excellent fruit in the Venafrum hill country of Campania, where the soil was gravelly and the rainfall amounted to 30 inches.¹²⁵ Hence it was a question of soil in relation to climatic condition. But exposure also came into the problem. The site of the olive grove might vary; but a location near the sea which reduced the frost hazard, and a westward facing slope were always preferable.¹²⁶

Olive orchards required only moderate cultivation, because they were inured to the dry summers. It was necessary to prune, to manure, to plow or dig about the trees each year, and occasionally to bare the surface roots and clean away the suckers.¹²⁷ Improved methods of tillage which developed in course of time greatly curtailed the interval between planting the slow-growing orchard and reaping a

¹²¹ Pliny, XV, 3-4.

¹²² Columella, V, 8.

¹²³ Vergil, *Georgics*, II, 177-183.

¹²⁴ Cato, 6; Varro, I, chap. xxiv, 1-2; Theophrastus, *Historia*, Pt. II, chap. v, 7.

¹²⁵ Pliny, XVII, 3.

¹²⁶ Cato, 6; Varro, I, chap. xxiv, 1.

¹²⁷ Columella, V, 9, 15.

crop. Hesiod said that a man who planted a olive grove would never live long enough to eat its fruit; but young trees raised for five years in the nursery bed and cultivated after transplanting could be made to yield in seven years. But this was only under the best climatic conditions; in many localities the interval was longer.¹²⁸

FIG ORCHARDS

Figs ranked next to olives as an article of food. They were grouped with bread and oil in the diet of the common people throughout the Mediterranean lands.¹²⁹ Cato advised that farm slaves should be fed chiefly on figs from the summer solstice, when the first crop came in, till late autumn.¹³⁰ Dried figs were eaten by the country folk all winter in Italy,¹³¹ they were welcome as army rations in ancient Palestine,¹³² and once served instead of grain for the forces of Phillip of Macedon in western Asia Minor,¹³³ doubtless owing to their sugar content.

Fig trees were adapted to a semi-arid climate, owing to their numerous spreading roots¹³⁴ and their scant leafage,¹³⁵ which lost little moisture by evaporation. They thrived best where the rainfall was light and the summer drought long; they preferred a sunny, well drained site on a hillside and a thin dry soil of weathered limestone or chalk, mingled with gravel or rocks.¹³⁶ Hence districts offering these natural conditions raised famous figs,—Caria and Phrygia in south-west Asia Minor where the "Smyrna figs" are raised today,¹³⁷ the island of Chios and even Paros with its soil of weathered

¹²⁸ Pliny, XV, 1.

¹²⁹ *Judges*, IX, 8-13; *Habakkuk*, III, 17; *Odyssey*, XXIV, 243-246; Plutarch, *Lucurgus*, XI.

¹³⁰ Cato, 56.

¹³¹ Columella, XII, 14.

¹³² *I. Samuel*, XXV, 18.

¹³³ Polybius, XII, 10.

¹³⁴ Theophrastus, *Historia*, Pt. I, chap. vi, 3.

¹³⁵ Pliny, XVII, 18.

¹³⁶ Columella, V, chap. x, 9; Palladius, IV, 10, 25-26.

¹³⁷ E. Banse, *Die Turkei* (Berlin, 1916), 143-144.

marble,¹³⁸ and Attica which forbade the export of its figs, needing to conserve all its scant home-grown food supply.¹³⁹ Theophrastus must have had the infertile land of Attica in mind when he advocated a low or valley site for fig and olive orchard.¹⁴⁰ Italy, which acclimated many imported fig trees, planted one kind in a light chalky soil, and another in a rich or well manured soil.¹⁴¹ Only the Megarean and Laconian fig were improved by irrigation, which was detrimental to all other kinds.¹⁴² Hence the numerous varieties, twenty-nine in Pliny's time,¹⁴³ finally extended the possible selection of fig orchard sites; but lean hillsides held the preference.

CAPRIFICATION

Fig trees yielded their crop in June and again in September. The late fruit hung on the trees all winter to be harvested at will. The failure of the crop was a serious matter. Yet the domestic trees, except the varieties grown in middle Italy, and the Isthmus of Corinth, frequently made a diminished yield owing to the dropping of the immature fruit. A remedy for this evil was assiduously sought, Theophrastus tells us, and was found in caprification. This consisted in attaching to the branches of the domestic trees, which bore only female flowers, the fruit of the wild fig or caprifig, in order that minute gall wasps, *psenes*, which were generated therein, might crawl into the half-developed edible fruit of the domestic fig. The time for the operation was in late June and again in September, when the wild figs contained abundant male flowers with their pollen, and the insects were ready to emerge.¹⁴⁴ This natural process was properly

¹³⁸ Athenaeus, III, 6-9.

¹³⁹ Plutarch, *Solon*, XXIV.

¹⁴⁰ Theophrastus, *De Causis*, III, chap. vi, 6.

¹⁴¹ Cato, 8, 1; 40, 1; Varro, I, chap. xlv, 4; Pliny, XV, 19.

¹⁴² Theophrastus, *De Causis*, III, chap. vi, 6.

¹⁴³ Pliny, XV, 19.

¹⁴⁴ Aristotle, *De Animalibus*, V, 146; Theophrastus, *Historia*, Pt. II, chap. viii, 1-2, *De Causis*, II, chap. ix, 3, 6-15; Columella, XI, 2, 56.

interpreted by Theophrastus as cross fertilization of the fig fruit by an insect.¹⁴⁵

The ancient Greeks thus improved upon nature's method, while following nature's example, at a very early date; they had doubtless learned from older cultivators of the fig in Syria and Asia Minor to tie bunches of the wild fruit on the domestic fig tree in order to insure a short journey for the insect to its destination. However, a like purpose was achieved by planting caprifigs in the fig orchards, the early variety near the early, and the late near the late kind, if the wild trees were set out on the windward side of the orchard so that the breezes might aid the flight of the little insects to the domestic trees.¹⁴⁶ This method was less troublesome but also less reliable, especially in late summer when the strong north winds might sweep the insects quite away.¹⁴⁷ These pollen-carriers were necessary to save the figs which were best adapted for drying; and caprification also improved the flavor of the fruit. Hence the insects were made the subject of careful study by the ancients. The *psenes* were found to have an enemy in the *cynipes*. The Greeks discovered a corrective for this state of affairs in *cancri* (literally crabs) which preyed upon the *cynipes* and which therefore were applied to the trees.¹⁴⁸ The *cynipes* and *cancri* have not been certainly identified, but the *psenes* are known to moderns as the *blastophaga grossorum*. They were colonized in California from Caria after Smyrna fig trees were introduced into that state between 1880 and 1890. There, also, the immature fruit dropped until caprification was practised.

PALM CULTURE

A similar method was used to fertilize palm trees and prevent their dropping the immature dates. It consisted in

¹⁴⁵ Theophrastus, *Historia*, Pt. II, chap. viii, 4.

¹⁴⁶ Theophrastus, *De Causis*, II, chap. ix, 5-6.

¹⁴⁷ Aristotle, *De Animalibus*, V, 146; Theophrastus, *Historia*, Pt. II, chap. viii, 1.

¹⁴⁸ Theophrastus, *Historia*, Pt. II, chap. viii, 3.

cutting off the spathe of the male palm and shaking out its pollen over the flower of the female tree. From its resemblance to caprification, this treatment of the palm was called *olynthazein* or "the use of the wild fruit." "In the latter case it was a genuine marriage; in the former, the same result was achieved in a different manner," says Theophrastus, anticipating Darwin by 2165 years.¹⁴⁹

What the fig and olive were to the northern and eastern coast lands of the Mediterranean, the date palm was to the hot southern rim. It furnished nourishing fruit, cakes, wine, fiber and inferior wood. The Arab saying that the date palm flourishes with its head in fire and its feet in water indicates the conditions for its cultivation: tropical heat, aridity, saline soil, and irrigation. Though the tree grew at certain places on the European coast, it was either sterile or yielded immature dates.¹⁵⁰ The northern limit of its growth in ancient Aegean lands ran through Chios, Delos, Tenos and the southern end of Euboea, where it runs unchanged today.¹⁵¹ The palm was fecund in Libya, Egypt, Phoenicia, Syria, Cyprus, and Crete; but yielded dates suitable for drying only in the Dead Sea Jordan Valley.¹⁵² This depression, 682 to 1293 feet below sea level in the rain-shadow of the Judean Plateau, insured torrid heat and an arid climate with a scant eight-inch rainfall. Springs breaking out along the step-faults of the Jordan rift provided irrigation water. Hence the excellence and fecundity of the date plantations were unsurpassed, and made Jericho famous as "the city of the palms."¹⁵³

VINEYARDS

The culture of the vine presented many problems of adjustment to geographic conditions. Maturing its fruit

¹⁴⁹ Theophrastus, *Historia*, Pt. II, chap. viii, 4; *De Causis*, III, 18, 1; Pliny, XIII, 7.

¹⁵⁰ Theophrastus, *Historia*, Pt. III, chap. iii, 5; Pliny, XIII, 6.

¹⁵¹ Naumann and Partsch, *Physikalische Geographie von Griechenland* (Breslau, 1885), 410-411.

¹⁵² Pliny, XIII, 6; Theophrastus, *Historia*, Pt. II, chap. vi, 2, 5, 8, 9.

¹⁵³ *Deuteronomy*, XXXIV, 3; *Judges*, I, 16; III, 13; Pliny, V, 15.

in August and September, it had to run the gauntlet of the dry summer months. Vineyards were planted on low moist ground in the semi-arid districts like Attica,¹⁵⁴ but on fertile slopes of hills and mountains in the better water parts of the region.¹⁵⁵ There was a choice also in the exposure. Most authorities advise a southerly aspect for the vineyards. Vergil condemns a western exposure,¹⁵⁶ but in some localities it was preferred to an easterly one. In northern sections, as in the Po Valley, another motive came into play owing to possible frosts. There vineyards regularly faced north or northeast; this exposure proved advantageous,¹⁵⁷ doubtless because the blossoming was retarded beyond the frost limit. Some planters selected the exposure according to the humidity of the locality. In a dry section, they faced the vineyard east or north to conserve the moisture in the plants, but in a humid region they planted the vineyard on a southward slope. Vines and trees to which dews were injurious were given an eastern exposure, that the sun might quickly evaporate the moisture; but those helped by the dew were made to face west or north in order to retain the precious moisture as long as possible.¹⁵⁸

TRAINING OF VINES

The training of vines also was adjusted to climatic conditions. Where the ground moisture was abundant or where rare showers relieved the summer drought, vines were grown on posts or trellis or they were festooned from tree to tree in an *arbusta*.¹⁵⁹ The latter method of training was found chiefly in northern regions like Latium, Etruria, the Po Valley, and western and northern Hellas, where exposure

¹⁵⁴ Theophrastus, *Historia*, Pt. II, chap. v, 7.

¹⁵⁵ *Isaiah*, V, 1-2; *Jeremiah*, XXXI, 5; Vergil, *Georgics*, II, 36-37, 184-194.

¹⁵⁶ Vergil, *Georgics*, II, 298, 357.

¹⁵⁷ Pliny, XVII, 2.

¹⁵⁸ Pliny, XVII, 3.

¹⁵⁹ *Iliad*, XVIII, 564-565; Varro, I, chap. viii, 3, 5; Pliny, XIV, 3; XVIII, 35.

to the winds did not dry out the moisture of the plants. In arid regions like Africa, southern Spain, Sicily, southern Greece, Palestine, Syria, and parts of Asia Minor, the vines were allowed to trail on the ground, and only the grape-bearing shoots were supported by short forked sticks.¹⁶⁰ The advantage was obvious. Plants spreading out over the field presented the greatest possible surface to the heavy dews of high slopes; owing to their low position they were little exposed to the desiccating summer winds, and their foliage shaded the soil about their roots. This was the method of planting in ancient times and it may be seen today in such districts.

The vines suffered, however, from the depredations of field mice and foxes, "the little foxes that spoil the vines" mentioned in the Song of Solomon.¹⁶¹ Varro said that in the island of Pantellaria each vine thus planted needed a mouse trap and a fox trap.¹⁶² Aesop who wrote the fable of the Fox and the Sour Grapes lived in Phrygia in the sixth century B.C. He was accustomed to the ground-grown vineyards of southern Asia Minor and also to grape-eating foxes. Therefore the thirsty marauder of the fable was disappointed when he came upon a trellis vine, doubtless a novelty introduced by Greek colonists from northern Hellas; for the fox expected to find the grapes lying on the ground within his reach. Theocritus in one of his Sicilian idyls gives us a charming description of such a vineyard.¹⁶³ It is twilight. A little lad sits on the rough wall guarding the vines, which are laden with fire-red clusters; for it is summer when the springs have dried up and wild animals are thirsty. Below him two foxes are skulking; one goes along the fine vine rows to devour the juicy grapes, and the other is eating the lunch in the wallet which the boy has dropped on the ground at his feet. For the little lad, perched on the vineyard wall, is absorbed in plaiting a pretty

¹⁶⁰ Varro, I, chap. viii, 1, 5-7.

¹⁶¹ *Canticles*, II, 15.

¹⁶² Varro, I, chap. viii, 5.

¹⁶³ Theocritus, *Idyl I*; compare *Idyl V*.

locust cage from stalks of asphodel; and less care of his wallet has he, and of the vines he was sent to guard, than delight in his interesting task.

Vineyards were allowed to sprawl on the ground also in Liguria on the slopes of the Apennines and on the Mediterranean coast of the Rhone lowland; but the climatic reason here was different. The low situation was a protection against the fierce *mistral* or Circius wind, which swept down from the heights of the Cevennes Plateau with irresistible violence.¹⁶⁴ This method of planting may be seen in Languedoc and Berry today, where the vine rows are generally protected also by a wind-break of cypress trees. The severe summer winds of north Africa provided an additional reason for the ground planting there. Moreover the shoots were pruned away above the first branches and the vine stock thus kept low.¹⁶⁵ This ground planting had the further advantage of economy, because it avoided the cost of props and trellis. Altogether, differences in soil, climate and location, determined the method of cultivation. Wherever the soil was damp, the vine was by preference grown high, for the grapes when forming needed plenty of sun and the vine shoots by natural inclination climbed up the highest trees, where they were supposed to yield the finest juice.¹⁶⁶

VINE-DRESSING

The vine-dresser also helped to conserve the moisture in the vine. He ploughed deep and cut away the surface roots of the plant in early spring in order to force the development of the lower roots running down to the underground moisture.¹⁶⁷ He pruned also to throw the strength into a few shoots and increase the yield of fruit,¹⁶⁸ but in so doing he also reduced the surface of evaporation. The same end was

¹⁶⁴ Pliny, XVII, 2.

¹⁶⁵ Pliny, XIV, 3.

¹⁶⁶ Varro I, chap. viii, 7.

¹⁶⁷ Columella, II, 2.

¹⁶⁸ Theophrastus, *Historia*, Pt. II, chap. vii, 2.

accomplished also by the habit of thinning out the leaves as the summer advanced and the vintage approached.¹⁶⁹ The remaining leaves in time shriveled in the dry heat and ceased their function of transpiration; but even this was not enough. At the end of August, when the summer's heat and drought reached their maximum, and evaporation was most intense, the soil of the vineyard was regularly reduced to a powder; the dust was tossed up into the air and allowed to settle all over the vines as a protection against the sun.¹⁷⁰ This process, which was called *pulveratio*, checked evaporation from the grapes, leaves, and from the earth about the roots, by preventing capillary attraction of the underground water. This same method was applied in Megara during the September heat to cucumber and squash plants. The fruits were made far sweeter and more tender by this natural conservation of moisture than by the alternative measure of irrigation.¹⁷¹ In the hot regions of north Africa and southern Spain the vine-dressers covered the grapes with straw to protect them from sun and wind. On the other hand, in northern parts of the Mediterranean region, where the vintage came late and the grapes were occasionally caught by the September showers, the vine-dressers stripped the leaves from the vine to expose the grapes to the intermittent sunshine, and thus hastened their ripening, lest they should rot on the vines.¹⁷²

DRY FARMING IN VINEYARDS

The cultivation of the ancient Mediterranean vineyards represented a thorough system of dry farming, designed to conserve the moisture in the soil and in the plant during the whole period of growth. This involved constant hoe and

¹⁶⁹ Xenophon, *Oeconomicus*, XIX, 18; Vergil, *Georgics*, II, 400.

¹⁷⁰ Theophrastus, *Historia*, Pt. II, chap. vii, 5; *De Causis*, III, chap. xvi, 3; Columella, IV, 28, 1; XI, 2, 60.

¹⁷¹ Theophrastus, *Historia*, Pt. II, chap. vii, 5.

¹⁷² Columella, XI, chap. ii, 61.

spade work during spring and summer.¹⁷³ Vergil's instructions required unremitting labor in the vineyards frequent plowings, banking up the earth repeatedly against the vine stalks, loosening the soils "thrice and again," breaking up the earth with hoe or mattock, "wheeling the steaming oxen between the vineyard rows."¹⁷⁴ That nothing might interfere with constant cultivation, all authorities from the Vergil advised against the planting of other crops between the vine rows. A system of clean culture was necessary. "Thou shalt not sow thy vineyard with divers seed, lest the fruit of the vineyard be defiled," says the author of *Deuteronomy*.¹⁷⁵ The purpose of this injunction was to facilitate constant cultivation of the vineyard soil, and to let the vine absorb all the moisture and nourishment in the ground. Columella sanctioned only the interculture of a short-lived green-manure crop, to be ploughed in.¹⁷⁶ A cover crop of legumes is common today in vineyards in Mediterranean regions which command sufficient water for irrigation; more common is a companion crop (*culture intercalaire*), planted for its own sake, which in Italy greatly reduces the yield of the vineyards.¹⁷⁷

The ancients considered viticulture one of the most profitable branches of husbandry.¹⁷⁸ The yield of the vineyards seems to support this opinion. Some parts of Italy yielded 300 amphora of wine to the *jugerum* or 3100 gallons to the acre, equivalent to 19,000 bottles. This was the return in the Faventia district at the northern base of the Apennines near Bologna. The Ager Gallicus on the Adriatic coast of Umbria yielded 200 amphora to the *jugerum* or 2000 gallons to the acre.¹⁷⁹

¹⁷³ *Isaiah*, V, 6; Hesiod, *Work and Days*, II, 250-254; *Odyssey*, XXIV, 224-226; Cato, 33.

¹⁷⁴ Vergil, *Georgics*, II, 398-400.

¹⁷⁵ *Deuteronomy*, XX, 9.

¹⁷⁶ Columella, XI, chap. ii, 60.

¹⁷⁷ *International Yearbook of Agricultural Statistics* (Rome, 1922), Tables 34 and 37

¹⁷⁸ Columella, III, 3.

¹⁷⁹ Varro, I, chap. ii, 7.

It was the wine-making connected with the vineyard culture which gave the large profit. Hence this twin industry was highly developed on small mountainous islands and peninsulas, and there it produced famous wines. Some of the best wines of the Grecian world came from Chios, Melos, Lesbos, Thasos, Ikaros, Andros, Naxos, Peparetos, Cyprus, and the Cnidos peninsula. All these islands had a large export trade.¹⁸⁰ In Italy the famous Falernian wine grew on the southward facing slopes at Mt. Massicus, where a thick soil of weathered volcanic rock overlay limestone strata. Vesuvius and Aetna, the Alban Mountains, and other volcanic districts produced superior wines.¹⁸¹

The earliest wine of great celebrity, lauded in the *Odyssey*, came from vineyards on the seaward slope of the Ismarus range, which traces the southern coast of Thrace. It was red and "honey-sweet" with a fine bouquet, and so strong that it had to be diluted with twenty parts of water.¹⁸² This same district in Pliny's time produced a wine that could stand dilution with eighty times its volume of water.¹⁸³ Phoenician seamen, half traders, half pirates, put into the ports of Homeric Greece and sold choice wines from vineyards spread like a carpet over the Mediterranean slope of the Lebanon Mountains. These were the solace of the tired farmer, as Hesiod sings their praise. "At the height of summer when the grasshopper sounds his shrill note, when the heat is greatest and the skin is parched and dry, under a shady ledge of rock with a bowl of Byblian wine, three-fourths water, let me rest by an ever-flowing spring."¹⁸⁴

¹⁸⁰ Pliny, XIV, 4, 9.

¹⁸¹ Strabo, V, chap. iii, 1; chap. iv, 3; XIII, chap. iv, 11.

¹⁸² *Odyssey*, IX, 208.

¹⁸³ Pliny, XIV, 6.

¹⁸⁴ Hesiod, *Work and Days*, 582-595.



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ANCIENT MEDITERRANEAN AGRICULTURE

PART II. MANURING AND SEED SELECTION*

BY ELLEN CHURCHILL SEMPLÉ

The essence of ancient Mediterranean agriculture was the improvement of the soil, both in its mechanical and chemical composition. Working the land accomplished the first; manuring, the second; the biennial fallow contributed to both ends, while conserving the precious moisture in the soil.

Despite the fallow, overcropping was a persistent danger owing to the highly specialized utilization of the land, which arrested the development of crop rotation; owing also to the small amount of arable land rendered available by conditions of climate and relief. Olive groves were made to support a grain crop in alternate years; the *arbustum* field often yielded a second harvest between its vine-draped trees. The irrigated land with its summer and winter crop was doubly taxed and had to be doubly compensated; for the soil sends in its bill for every pound of plant food which is taken out.

MANURING

Hence the ancients developed the art of manuring to a surprising degree, in order to get a maximum yield from the limited tillage land and to replenish the nutriment in exhausted fields. In Palestine during the Mishnah period, irrigated land which was cropped twice annually was manured a second time before the summer seeding.¹ Everywhere irrigated hay meadows, which were mown three or four times a year, and alfalfa fields which yielded four or five harvests had to be amply fertilized at the planting.² Moreover, in years of heavy rains when soil moisture

* Part I of this article appeared in the April number of *Agricultural History*.

¹ H. Vogelstein, *Landwirtschaft in Palästina zur Zeit der Mišnah*. (Berlin, 1894), 24.

² Cato, *De Re Rustica*, 40; Varro, *Rerum Rusticarum*, I, 29; Pliny, *Historia Naturalis*, XVIII, 43 and 67.

was abundant, the farmer found he could avoid the economic waste of the fallow by judicious fertilization and some rotation of crops.

Without science the ancients evolved a scientific system of manuring, which became a conspicuous feature of their intensive tillage. They discriminated between various manures as to strength, and their relative value for different crops and different soils. Without chemistry they learned to conserve the important chemical elements of farm manure; and without bacteriology they learned how to get the maximum result from the bacteria in their compost heaps and their legume crops. They apportioned the amount of the manure to the quality of the soil, and in their gardens they practiced "head-fertilizing" (*kopfdüngung*) like the modern Japanese, feeding the individual plant rather than enriching the whole field.

Burdened with the labor of conserving the nutriment and moisture in the soil, the ancients looked with envy upon the easy tillage processes of Babylonia and Egypt. In the Tigris alluvium, "cultivation of the land consists in letting the water lie on it as long as possible, so that it may deposit much silt."³ Herodotus considered that the Egyptians of the Delta garnered the fruits of the earth more easily than all other people, for they escaped the endless toil of plowing, harrowing, hoeing and fertilizing which other men had to perform to obtain a crop of grain.⁴

ASHES PRIMITIVE MANURE

The first lesson in soil compensation was forced upon the peasants' notice. Stone Age cultivators burned the forests to clear the land, because their blunt axes made slow work of felling hardwood trees. Ashes were found to enrich the ground and adopted as the first obvious fertilizer in the Mediterranean countries as elsewhere. The ancient Jews set fire to briars, thorn bushes and other scrub growth.⁵ It was a common practice everywhere to burn the stubble of the previous crop on the land

³ Theophrastus, *De Historia Plantarum*, VIII, 7, 4.

⁴ Herodotus, II, 14.

⁵ *Exodus*, XXII, 6; *Isaiah*, IX, 18.

to clear the fields and destroy the weeds.⁶ However, this was an uneconomic method of converting the vegetable waste into fertilizer, because it dissipated the volatile elements like nitrogen and moisture; so most of the straw was utilized in other ways. But Cato advised the vine-dresser to burn the prunings of the vineyard on the spot and plough in the ashes to stimulate growth.⁷ The advice was sound since wood ashes supply lime, potash and phosphoric acid to the soil; and it is exactly the small shoots and twigs which contain these chemicals in great amount.⁸

The principle of applying various animal and vegetable refuse to the soil originated with the beginning of migratory agriculture. The droppings of the flocks and herds about the nomad camp or in the open pasture revealed their power to enrich the land. The invention of manuring was ascribed to various gods and heroes, notably to King Augeas of Elis and to Hercules,⁹ whose labor of cleansing the Augean stables by turning a river through them might be interpreted as the simultaneous application of irrigation and barnyard manure, a common practice among the ancients. The dunghill meets us in the courtyards of Ulysses and Laertes his father;¹⁰ it was very ancient among the Jews who probably learned its value from the local Canaanites.¹¹ They carried all the manure of Jerusalem from the city by the Dung gate to the gardens outside.¹² The power of dead bodies to fertilize the ground after a battle or execution was known to the Greek Archilochus by 700 B.C.¹³ and even earlier to the Jews.¹⁴ Jeremiah emphasized the value of bone-dust,¹⁵ and Deuteronomy directed the blood of slaughtered animals to be poured out on the ground, a practice which persisted for centuries.¹⁶ The tragic

⁶ *Isaiah*, V, 24; Xenophon, *Oeconomicus*, XVIII, 2; Vergil, *Georgic I*, 84.

⁷ Cato, 37.

⁸ W. P. Brooks, *Agriculture* (Springfield, Mass., 1905), II, 282.

⁹ Pliny, XVII, 6.

¹⁰ *Odyssey*, XVII, 297-299; XXIV, 225.

¹¹ *I. Samuel*, II, 8; *II Kings*, IX, 37.

¹² *Nehemiah*, II, 13.

¹³ Plutarch, *Marius*, XXI.

¹⁴ *Jeremiah*, IX, 22; XVI, 4; *II Kings*, IX, 37.

¹⁵ *Jeremiah*, VIII, 1-2.

¹⁶ *Deuteronomy*, XII, 16, 24; XV, 23; Vogelstein, *op. cit.*, 19.

fertility of old battle-fields belonged to the spot where Caius Marius wiped out the Teutonic horde at Aquae Sextiae in 102 B.C. "They say that the soil, after the bodies had rotted and the winter rains had fallen, was so fertilized and saturated with the putrefied matter which sank into it, that it produced an unusual crop the next season."¹⁷ This effect was doubtless observed wherever men fought and tilled the land, from Megiddo to Flanders field.

"I sometimes think that never blows so red
The rose as where some buried Caesar bled."

FARM MANURES

The main source of animal manures was in the flocks and herds, whose value came largely from the dung to enrich the soil, according to Varro.¹⁸ To maintain a proper balance between live stock and crops was difficult for the Mediterranean farmer, because the long summer drought necessitated keeping his animals for five or six months every year on the mountain pastures. Hence nearly half their manure was lost to the home farm. The amount available for the fields was limited to that provided by the few stall-fed oxen, asses and mules kept on the farm as work animals during summer; and by the returning flocks and herds which were pastured during winter on the home land. It was customary to fold them at night on the meadows, shifting them systematically, so that their droppings were evenly distributed. Their fresh manure insured a good stand of grass.¹⁹ This method of applying the manure saved waste of organic material and of labor, but was best suited to meadows. For grain crops old rotted manure was best. The dunghill possessed special importance in dry countries like Palestine, Syria, Asia Minor and Greece, because it supplied humus to the soil. This element of plant food is always scant in clean-cultured fallow fields and in the thin herbage of semi-arid soils. To husband his manure was the farmer's first duty. Xenophon criticized peasants who failed to collect

¹⁷ Plutarch, *Marius*, XXI.

¹⁸ Varro, *R. R. Praefatio*, 4.

¹⁹ Cato, 30; Columella, *De Agricultura*, II, 15, 9; Pliny, XVIII, 53; Vogelstein, *op. cit.*, 19-21.

dung.²⁰ Gathering it from stall and sheepcote was a regular task of the farm of Ulysses in Ithaca.

Greeks and Romans employed human excrements and the dung of cows, horses, asses, sheep, goats, swine, poultry, pigeons and various other birds. The Jews used the manure of these animals and also that of camels, but from human sources only the urine, which was applied in diluted form to the land.²¹ These several animal manures were known to possess various degrees of efficiency, because they had been tested for ages and their relative values estimated, as Pliny states.²² The surprising fact is how closely the ancient estimates agree with the results of chemical analyses made in modern agriculture laboratories, though the ancient authorities differed in details from each other.

Theophrastus ranks manures in point of richness or concentration as follows: (1) human excrements, (2), that of swine, (3), of goats, (4), of sheep, (5), of cows and oxen, (6), of beasts of burden or horses, mules and asses. He adds that these are different from one another and need to be differently applied.²³ He explains that manure of beasts of burden is "bad because it is most apt to lose its moisture."²⁴ This was true if the manure was placed only half rotted in a dry soil during a dry season, such as Attica provided.

The Roman authorities considered bird and chicken manures the richest, especially the droppings in dovecotes and aviaries; but they ranked low the excrements of ducks and geese,²⁵ a significant evidence of their close observation. In this opinion modern agricultural chemists concur. Poultry manure combines the solid and liquid elements with a minimum loss of the latter, which contains most of the nitrogen, while the solid matter contains large percentages of potash and phosphoric acid. Pigeons' manure is the richest; hens' manure stands next. Much

²⁰ Xenophon, *Oeconomicus*, XX, 10; Cato, 5.

²¹ Vogelstein, *op. cit.*, 18-20.

²² Pliny, XVII, 6.

²³ Theophrastus, *Hist. Plant.*, II, 7, 4.

²⁴ Theophrastus, *De Causis Plantarum*, III, IX, 2; *Hist. Plant.*, VII, 5, 1.

²⁵ Varro, I, 38; III, 7; Columella, II, 15.

lower comes ducks' manure, and that of geese ranks far down in the scale.²⁶ The differences are largely the result of different feeding; pigeons and poultry have concentrated food. The ancients, too, recognized that the feed of animals affected the quality of the manure. For instance, cytissus or snail clover, a popular legume fodder lauded by Columella, was thought to enrich all animal excrements.²⁷

Varro's list, quoted from Cassius (40 B.C.) who probably relied on Mago, is as follows: (I) Manures of birds and fowls. (II) of human beings. (III) That of goats, sheep, swine and asses. (IV) That of horses and draught animals fed on barley. This, however, was the best for meadows, because it stimulated the herbage.²⁸ Columella accepted this classification as to groups; but for farm dung he ranked the ass first, sheep second, goats and horses third, and swine lowest.²⁹ Modern experiments corroborate these ancient estimates, especially for swine dung and human manure. The former is rich in phosphoric acid but poor in nitrogen, the element most needed by Mediterranean soils; the latter contains high percentages of nitrogen and phosphoric acid. It was so concentrated that Columella advised its being diluted or mixed with farm refuse, lest it burn the soil. When properly handled, it was excellent for vines and fruit trees, which therefore ought to be planted near the bagnios. In undiluted form it was good for poor sandy land.³⁰

COMPOST HEAP

The chief dependence of the ancient farm was the manure pile. Therefore it received the best care. It was kept preferably in a water-tight cemented pit covered over to prevent loss of its moisture by drainage, leaching or evaporation, and was kept a year to rot before being placed on the land.³¹ Straw, leaves, weeds from the fields, reeds and sedges from swamps or willow

²⁶ W. P. Brooks, *op. cit.*, II, 233-234.

²⁷ Pliny, XVII, 6.

²⁸ Varro, I, 38.

²⁹ Columella, II, 15.

³⁰ Columella, I, 6; II, 16; V, 10; Pliny, XVII, 6.

³¹ Columella, I, 6; Pliny, XVII, 8.

plots were bedded under the farm animals,³² and when trodden down added to the bulk and humus value of the manure,³³ beside conserving the urine. Isaiah speaks of "straw trodden down for the dunghill."³⁴ Into the compost heap went every form of organic refuse,—chaff, husks, pods, dead leaves, ferns, bean stalks, lupine straw. Columella added to this list weeds from the hedgerows, ashes, sewage and every kind of waste; and he emphasized the value of vegetable refuse on farms without cattle.³⁵ Xenophon found that weeds gathered from the fields and allowed "to rot in stagnant water made good manure to gladden the field."³⁶ To these various organic ingredients of the compost heap salt was added in Palestine. "Salt that has lost its savour is fit neither for the land nor for the dunghill."³⁷ Its value lay in its power to retain moisture, retard decomposition, and react on certain inert compounds, so that their lime and potash were more available.³⁸

When the contents of the compost heap were well rotted, they were carted out, spread on the land, and ploughed in promptly to conserve moisture. This was done in Italy after a rain in September for an autumn crop, and for a spring crop in late winter when the ground was still wet.³⁹ There was a period when the manure was at its best. If too new or imperfectly rotted, it burnt the seed and the roots of trees;⁴⁰ if kept longer than a year it lost strength.⁴¹ Concentrated manures, if undiluted or applied in excess, were likely to burn and dry out the soil. "The dung most recommended is that which is mixed with litter," is the generalization arrived at by Theophrastus;⁴² for the ancients like the

³² Cato, 5 and 37.

³³ Theophrastus, *Hist. Plant.*, VII, 5, 1.

³⁴ *Isaiah*, XXV, 10.

³⁵ Vogelstein, *op. cit.*, 19; Cato, 5 and 37; Columella, II, 15.

³⁶ Xenophon, *Oeconomicus*, XX, 11.

³⁷ *Luke*, XIV, 35.

³⁸ W. P. Brooks, *op. cit.*, II, 315.

³⁹ Cato, 5; Pliny, XVIII, 53.

⁴⁰ Pliny, XVII, 46.

⁴¹ Columella, II, 15.

⁴² Theophrastus, *Hist. Plant.*, VII, 5, 1. Compare Xenophon, *Oeconomicus*, XVIII, 2.

moderns recognized the effect of litter in diluting manure,⁴³ and they apparently adopted a rule for the proportion of bedding to be used. "Where sheep furnish a cartload of manure, the larger cattle should furnish ten loads; otherwise it is clear proof that the husbandman has littered his animals badly."⁴⁴ A standard bulk gave a standard strength, so far as this was affected by the litter and not by the kind of dung. Very rich manures, like human excrements, which ferment quickly, were regularly diluted.⁴⁵ Bird and pigeon guano was powdered and thinly strewn over field and garden,⁴⁶ as it is today for the same reason.

A study of the treatment and application of animal manures by the ancients reveals a painstaking adjustment to climatic conditions, especially to the long summer period of warmth and drought, when the soil contains insufficient moisture for the decay of organic matter. Stable manure rots with great difficulty on or in land which contains scant moisture, because the necessary bacteria do not develop there in sufficient amount to produce the proper chemical changes in the manure. Unrotted manure keeps the soil open, allows its precious moisture to escape, and burns the crop. For this reason many dry farmers in semi-arid America do not use stable manure.⁴⁷ The ancients met this difficulty by composting the manure for a year to insure its complete decay, soaking it with its own fluids or with water when it became too dry, and turning it frequently to admit the air.⁴⁸ The final product of this organic decay was humus or mould, which might be seen "passed through a sieve like so much flour, and perfectly devoid, through lapse of time, of all bad smell or repulsive appearance."⁴⁹

⁴³ W. P. Brooks, *op. cit.*, II, 208.

⁴⁴ Pliny, XVIII, 53.

⁴⁵ Theophrastus, *Caus. Plant.*, III, 9, 2; *Hist. Plant.*, VII, 5, 1.

⁴⁶ Cato, 36; Varro, I, 38; Pliny, XVIII, 53.

⁴⁷ Wendell Paddock and Orville B. Whipple, *Fruit Growing in Arid Regions* (New York, 1914), 197.

⁴⁸ Columella, I, 6.

⁴⁹ Pliny, XVII, 6.

AMOUNT OF MANURE

From motives of economy and concern for a successful crop, the ancient farmer used no more manure than was absolutely necessary. "They tell us to manure a thin soil abundantly and a rich soil sparingly, both on account of the fertility of the soil and because the muck brings more nutriment than the land is able to take care of." Thus Theophrastus reports the general practice of farmers who feared the consequences of excessive manuring.⁵⁰ "It is better to manure little and often than in excess" was the Roman motto.⁵¹ Therefore after a fallow season, when the ground would have partly recuperated its strength, manures were applied only to very poor land or to very exacting crops like beans, hemp, alfalfa and barley.⁵² "Flax, oats and the sleep-giving poppy exhaust the soil, but it is easy to sow them in alternate years, provided you do not fail to soak the dry earth with rich muck and scatter foul ashes over the exhausted fields," says Vergil.⁵³

The amount of manure customarily used under average conditions of soil and weather is specified by Columella. For a *jugerum* of hillside land 24 loads of 80 *modii*, or 492 bushels, sufficed; this equalled 788 bushels to the acre. On level land only 18 loads per *jugerum* or 525 bushels per acre were required, though the larger amount was used on a field prepared for a bean (*faba*) crop immediately after a grain crop.⁵⁴

But weather conditions modified both the amount of manure and the method of its application; because a timely rain abated the danger attending excess. In an average autumn it was customary to manure the field just after a rain, then sow it, plough in seed and dung together, and then ridge and harrow;⁵⁵ but some farmers preferred to cast the manure and seed together.⁵⁶ The

⁵⁰ Theophrastus, *Caus. Plant.*, III, 20, 2. Compare Pliny, XVIII, 53.

⁵¹ Columella, II, 16.

⁵² Columella, II, 5, 10, 21, 23, 27, 31; XI, 2.

⁵³ Vergil, *Georg. I.*, 77-81.

⁵⁴ Columella, II, 5, 16; Palladius, X, 1, 2.

⁵⁵ Columella, II, 10.

⁵⁶ Theophrastus, *Hist. Plant.*, VII, 5, 1.

interval left between the two operations was always short, because the dung was known to loosen and warm the soil, thereby stimulating germination.⁵⁷ Some farmers spread the manure between the upper and under soil, where it was easily reached by the rain and carried down to the roots of the plants, but where it was protected from the desiccating heat of the sun.⁵⁸ This method preserved not only moisture but also the important chemical constituents in the fertilizer. Cato advised scattering pigeon guano over meadow, garden or sown field, further to enrich the land.⁵⁹ Instead of the regular manuring, where this had been omitted, it was necessary to spread the land with aviary dust just before the mid-winter hoeing.⁶⁰ At that season the rains would carry this rich fertilizer down to the roots as a tonic to the crop.

Always loomed the danger of excessive manuring. This was known to kill trees and grain crops, unless they got a saving shower. Therefore in rainy localities, frequent and abundant manuring was safe and efficacious; but in arid districts or in thin dry soil a moderate application was the wise course,⁶¹ and the avoidance of highly concentrated manures. To obviate all difficulty in a hot dry region, it was customary to fill the furrows or trenches with water and allow three days for its absorption, then throw the manure on this saturated soil, then plant and cover.⁶²

MANURING AND IRRIGATION

Rich, concentrated manures, whose plant food was quickly available, were generally used in gardens and orchards which needed quick feeding; but to obviate the danger of burning, they were applied in diluted form or were combined with regular irrigation. In the Aegean lands night soil and swine dung were applied with irrigating water to pomegranate and almond trees to improve

⁵⁷ *Ibid.*, VIII, 7, 7.

⁵⁸ Theophrastus, *Caus. Plant.*, III, 6, 1.

⁵⁹ Cato, 36.

⁶⁰ Pliny, XVIII, 53.

⁶¹ Theophrastus, *Caus. Plant.*, III, 9, 2.

⁶² *Ibid.*, III, 6, 2.

the flavor of the fruit and reduce the size of the seed or nuts.⁶³ In Italy, pomegranate trees were watered four times yearly with diluted human urine at the rate of one *amphora* or seven gallons to the tree.⁶⁴ Columella advises this treatment for vines and various fruit trees to improve the flavor and aroma of the fruit.⁶⁵ All the waste from the olive oil presses, the *amurca* and the rotted lees were applied in the same way to fruit trees and vegetables;⁶⁶ and therefore Columella advised that gardens and orchards be located near the poultry yards, *bagnios* and olive waste receptacles.⁶⁷ But Theophrastus advised great discrimination in the selection of manures, "for the same manure is not equally suited to all kinds of trees. The age of the tree also makes a difference."⁶⁸ Even the organic waste from the currier's shop consisting of wool, hair and leather scraps was used for vines and fruit trees; but as this material was rich and rotted slowly, it too was combined with irrigation.⁶⁹

Vegetables were equally avid of rich diluted manure. Theophrastus laid down the principle that all plants needing much nutriment needed also much water. Most vegetables germinated quickly, within five to ten days, and grew rapidly; hence their demand for food and ample water.⁷⁰ "All the pot-herbs are lovers of water and dung."⁷¹ Both were necessary to cucumber and gourds.⁷² When applied to cabbages in small quantities, they produced heads of the finest flavor; but in larger amounts, they produced larger heads of inferior flavor.⁷³ The truck gardens and olive groves about Athens were enriched by the sewage of the ancient city. The main *cloaca* or sewer ran across the city and through the *Dipylon* to a reservoir outside, from which

⁶³ Theophrastus, *Hist. Plant.*, VII, 51; *Caus. Plant.*, III, 9, 3; *Columella*, V, 10.

⁶⁴ Pliny, XVII, 47.

⁶⁵ *Columella*, II, 15.

⁶⁶ Cato, 93.

⁶⁷ *Columella*, I, 6.

⁶⁸ Theophrastus, *Caus. Plant.*, II, 9, 5; *Hist. Plant.*, II, 7, 3-4.

⁶⁹ Pliny, XVII, 46.

⁷⁰ Theophrastus, *Hist. Plant.*, VII, 1, 3.

⁷¹ *Ibid.*, VII, 5, 1.

⁷² Pliny, XIX, 24.

⁷³ Pliny, XIX, 41.

square or cylindrical brick-lined canals carried the contents to the intensively cultivated plain of the Cephissus valley, with its orchards and farms. One of these canals seems to show a device for regulating the flow, and suggests that the sewage was sold to the farmers.⁷⁴

MINERAL FERTILIZERS

All this sounds modern and scientific. Still more does the ancient use of mineral fertilizers. These were found in their native state, either as earths like marl, or as deposits of alkaline salts like carbonate of lime and nitrate of potassium (nitre). Mixing different kinds of earth was first advocated by Theophrastus as "a means of remedying defects and adding heart to the soil."⁷⁵ Such mixtures improved both the chemical and mechanical composition of the soil, for the added ingredients were either direct or "indirect fertilizers." The value of alkaline earths was early recognized, notably in prehistoric Aegina, where their use became a theme of mythology. On this small and populous island the surface stratum of poor freshwater limestone was underlaid, one or two yards below, by a stratum of fertile marl. So the inhabitants pierced the sterile veneer, dug out the marl, mixed it with the soil above, or even spread it on the bare rocks to create a field.⁷⁶ This habit of burrowing underground and using the excavations as dwellings fastened on the early Aeginetans the name of Myrmedons or ants.⁷⁷ Likewise in nearby Megara, where a poor surface soil was underlaid by thick strata of various marls,⁷⁸ the same thing was done with good effect.⁷⁹

The Romans imitated the practice of the Greeks and Gauls in the use of marl. They distinguished several varieties, and ap-

⁷⁴ Article on *Cloaca* in Smith, *Dictionary of Greek and Roman Antiquities* and Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft* (Stuttgart, 1901).

⁷⁵ Theophrastus, *Caus. Plant.*, III, 20, 3.

⁷⁶ C. Neumann and J. Partsch, *Physikalische Geographie von Griechenland* (Breslau, 1885), 348.

⁷⁷ Strabo, VIII, 6, 16.

⁷⁸ A. Philippson, *Der Peloponnes* (Berlin, 1892), 16.

⁷⁹ Theophrastus, *Caus. Plant.*, III, 20, 4.

plied them to grain and meadow lands, but they found the tufaceous and calcareous kinds the best for cereal crops. Like the modern farmers, they spread it very thinly on the ground to avoid burning, and found one such treatment sufficient for many years, though not fifty, as Pliny says. The white variety, if procured in the vicinity of springs (calcium carbonate) "rendered the soil immeasurably fecund for grain."⁸⁰ Columella advocated spreading marl on a gravelly soil or of mixing gravel with a dense calcareous soil, "as I have seen my uncle do. Thus he raised fine cereal crops and beautiful vineyards."⁸¹ This uncle was a gentlemen farmer, a Roman colonist in Spain, who cultivated his estate near Corduba (Cordova) on the Guadalquivir River.

Lime was added to the soil in other forms, either as broken or powdered limestone, which was applied to orchards, vineyards and olive groves,⁸² or as pumice stone and shells.⁸³ It was also provided by wood ashes, which were widely used as fertilizer in all parts of the Mediterranean region,⁸⁴ and which supplied phosphoric acid and potash as well as lime. Lime from the limekilns proved excellent for olive trees.⁸⁵ Some farmers living north of the Po and having a superfluous dung from their big herds of cattle, burned part of the manure by preference and applied the light ashes to the field.⁸⁶ Lime in any form was used to correct an acid soil. Sand was frequently mixed with a heavy clay or chalk soil to improve its mechanical composition in gardens and orchards,⁸⁷ and occasionally to facilitate drainage where the land had become saline.⁸⁸ Pliny disclaims any virtue in such a mixture, even when a red or black or white sand was combined with a rich earth.⁸⁹

⁸⁰ Pliny, XVII, 4, 6-8.

⁸¹ Columella, II, 16.

⁸² Pliny, XVII, 4, 47.

⁸³ Vergil, *Georg. II*, 348-350.

⁸⁴ Vogelstein, *op. cit.*, 19-20; Pliny, XVII, 5, 47; Vergil, *Georg. I*, 80.

⁸⁵ Pliny, XVII, 6.

⁸⁶ Pliny, XVII, 5.

⁸⁷ Vogelstein, *op. cit.*, 19-20; article on horticulture in *Jewish Encyclopedia*.

⁸⁸ Theophrastus, *Caus. Plant.*, III, 6, 3.

⁸⁹ Pliny, XVII, 3.

Sometimes the soil needed other elements. Nitre (nitrate of potassium) and salt were found beneficial to certain vegetables; therefore they were either sprinkled over the garden plots or applied in solution to the plants.⁹⁰ Radishes, beets, rue and asparagus were among the vegetables so benefitted both in flavor and growth.⁹¹ Nitre removed the excessive pungency of radishes, and increased the size of beans.⁹² Palm trees, which were known to require a saline soil, were treated with salt or brine about their roots.⁹³

GREEN MANURE CROPS

The drawback of these mineral fertilizers was their failure to supply humus, which was especially needed on arid soils and on clean-cultured fallow land. Hence the ancients scarcely relied on them to take the place of animal manures; but they devised instead by 400 B.C. or even earlier a system of green manure crops, which was also an improvement on the old fallow field system. Xenophon states that a green crop ploughed in enriches the soil as manure does,⁹⁴ but he does not specify the kind of crop. Theophrastus, however, reports that the farmers in Thessaly and Macedonia raised a bean crop and turned it under when it was in flower; because the bean (*faba vicia*) reinvigorated the soil, even when it was sown thickly and produced much grain. The reason he assigned for this effect was that "the plant was of loose growth and decayed quickly."⁹⁵ In his later book he makes the generalization that legumes do not take strength from the cultivated land but rather give it new strength. He made an exception however in the case of chick peas, because they required rich black soil and only served to exhaust the land.⁹⁶ In this opinion Cato concurred, specifying field beans, lupines and vetch as the best green manures for grain crops.⁹⁷ For thin soil Varro advocated ploughing in

⁹⁰ Pliny, XIX, 41; Luke, XIV, 35; Theophrastus, *Caus. Plant.*, III, 7, 8.

⁹¹ Pliny, XIX, 59.

⁹² Pliny, XIX, 26; Vergil, *Georg. I*, 194.

⁹³ Theophrastus, *Caus. Plant.*, II, 5, 3; III, 7, 1-4.

⁹⁴ Xenophon, *Oeconomicus*, XVII, 10.

⁹⁵ Theophrastus, *Hist. Plant.*, VIII, 7, 2; IX, 1.

⁹⁶ Theophrastus, *Caus. Plant.*, IV, 8, 1-3.

⁹⁷ Cato, 37 and 54.

snail clover or beans before they began to pod.⁹⁸ Columella enumerated lupines, beans, vetches, lentils, chick peas and other pea varieties as renovating crops, provided they were ploughed in as soon as the green fodder crop was harvested, before the fresh roots should become dry and withered. Clover and alfalfa, after they had yielded fodder for their appropriate number of years, were turned under when the crop began to deteriorate.⁹⁹

All the ancient authorities agreed however that the most economical and satisfactory green manure crop was lupines; it would thrive on dry, sandy, or gravelly soil or on *terra rossa*,¹⁰⁰ gave food for man and beast, was cheap to seed, quick to grow, blossomed three times; and to enrich the ground should be ploughed in just after the third flowering, or if planted on sandy soil, after the second flowering.¹⁰¹ Moreover it was so vigorous that it competed successfully with weeds and underbrush.¹⁰² Green lupine stalks enriched the soil exceedingly.¹⁰³ This ancient estimate of lupines as a green manure crop is sustained in every point by modern scientific agriculture.¹⁰⁴

By age-long experiment the ancients learned the power of legumes to open up and mellow the soil by their thick, deep-running roots; to keep down weeds by their thick cover growth and deeper roots; to put more nutriment into the soil than they took out of it; to increase the farm income by substituting a food crop for an idle fallow which demanded constant tillage; and especially the great economic profit in growing legumes like lupines or vetch, which would thrive on poor dry soils, as compared with chick peas which required a rich heavy loam. The ancients reveal a deep understanding of the manurial value of green legume crops, when they raised mixed fodder crops of legumes and grains;¹⁰⁵ and especially when they "found it very

⁹⁸ Varro, I, 23, 2-3; Pliny, XVIII, 30.

⁹⁹ Columella, II, 10 and 14.

¹⁰⁰ Theophrastus, *Hist. Plant.*, VIII, 11, 8; *Caus. Plant.*, IV, 7, 3.

¹⁰¹ Columella, II, 10; XVII, 6; Pliny, XVIII, 36.

¹⁰² Theophrastus, *Hist. Plant.*, I, 7, 3; VIII, 11, 8.

¹⁰³ Columella, II, 15; Pliny, XVII, 6.

¹⁰⁴ W. P. Brooks, *op. cit.*, II, 360.

¹⁰⁵ Varro, I, 31; Pliny, XVIII, 41-42.

profitable to sow garlic and onions between the rows of cytissus or snail clover,"¹⁰⁶ thereby anticipating the interculture of vegetables and legumes practiced today in intensive Japanese horticulture.

The ancients achieved results without chemistry and bacteriology, which have revealed the nitrogen-gathering bacilli harbored by the roots of legumes. These fix the free atmospheric nitrogen and incorporate it in the soil in the form of nitrates; thus they capture the most valuable and elusive element of plant food. The successful cultivation of legumes in all Mediterranean lands from earliest times indicates that the necessary bacteria were widely distributed. But the mixing of soils of different kinds, advocated by Theophrastus, may have owed its efficacy, so far as legumes were concerned, to the inoculation of the field with the necessary bacteria. This method of preparing land for clover crops has been practised in Kentucky for a hundred years or more, by borrowing a few barrels of soil from a neighbor's clover field; and it is now advocated by the United States Department of Agriculture.¹⁰⁷ Finally the ancients did not plough in the legume crop till the plants gave signs of podding; they postponed the operation till the critical date, taught only by long experience and observation. Modern laboratory experiments show that legumes of all kinds take nitrogen from the air in largest proportion as they approach maturity; so the ancients had sound basis for their practice.¹⁰⁸

ROTATION OF CROPS

Rotation of crops was apparently inaugurated by the alternate planting of grains and legumes. Rye was the only other crop definitely used to enrich the soil; but its use for this purpose came in late and was restricted to the upper Po Valley where the grain found a favorable rainfall.¹⁰⁹ But Pliny also indicates the ploughing in of millet and panic in the Alpine piedmont to ferti-

¹⁰⁶ Pliny, XIII, 47.

¹⁰⁷ J. M. Westgate, "Alfalfa," *Farmers' Bulletin* 339 (Washington, 1908), 17-18.

¹⁰⁸ W. P. Brooks, *op. cit.*, II, 365.

¹⁰⁹ Pliny, XVIII, 40.

lize the soil; he states that this was done just as the stem began to develop or had put forth two or three leaves.¹¹⁰

Otherwise, rotation of crops made limited progress. Varro advised that, in lieu of the fallow, the land be planted lightly with some other crop less exhausting than grain.¹¹¹ The fertile Neopolitan plain was cropped all year round, once with panic, twice with spelt, and occasionally a fourth time with vegetables,¹¹²—a series not calculated to conserve plant food. Pliny gives another rotation suited to black, friable soil of the kind described by Cato as “tender;”¹¹³ first barley, then millet, then rape, and finally barley again or wheat, with no cultivation between beyond ploughing when the seed was sown. Yet another rotation was spelt succeeded by a four-months’ winter fallow, then spring beans, then winter beans.¹¹⁴ This series provided amply for the compensation of the soil. The Romans had an effective system to renovate a worn-out meadow. After thorough ploughing, the field was planted in beans, rape, or millet, the next year in wheat, and the third year in some hay crop like clover or grass.¹¹⁵ An old tenant’s contract of Palestine in Mishnah times provided that barley should be raised the first year, onions the sixth of the Sabbatical cycle, and flax one year between; but beyond this it indicated no system of rotation.¹¹⁶ Greek authorities mention only the alternation of legumes and grain.

Despite Vergil’s generalization that “the fields rest by a change of crops,”¹¹⁷ rotation was little practised. This was the weak spot in ancient agriculture. It may have resulted from the conservative allocation of crops to selected terrains and soils, combined with the prevalence of small, naturally defined districts, in which exchange of crops between different fields was difficult or economically impossible. Consequently the persistent discrimination in

¹¹⁰ Pliny, XVIII, 49.

¹¹¹ Varro, I, 44, 2.

¹¹² Strabo, V, 4, 3; Pliny, XVIII, 29.

¹¹³ Cato, 151.

¹¹⁴ Pliny, XVIII, 52.

¹¹⁵ Pliny, XVIII, 67.

¹¹⁶ Vogelstein, *op. cit.*, 50.

¹¹⁷ Vergil, *Georg. I*, 82–83.

the use of certain soils for certain crops tended to crystallize into a rigid system. Rotation was restricted before it could advance. General farming, with balanced stock-raising and diversified field agriculture on a fairly ample scale, developed only in regions of low relief and abundant water, like the Nile and Po valleys; or in smaller districts of moderate relief and high fertility, like the hill-and-dale country about the old volcanoes of Etruria and Sicily, or like the productive lake basins of Greece. Moreover, the large area in all Mediterranean lands devoted to permanent plantations of orchards and vineyards contributed to this fixation of crops by restricting the arable land susceptible of rotation. The fallow system worked to the same end by halving the amount of land available at any one time for field agriculture. The result was the constant danger of over-cropping, and the steady evolution of manuring to safeguard the soil from exhaustion.

SEED SELECTION

The principle of seed selection was early advocated by the ancient farmers as a prime means of improving crops; and in the first decades of the Roman Empire it reached a development which has only recently been attained in America. This gospel, now preached by agricultural colleges, was adumbrated in the Hebrew Scriptures. The biblical injunction, "Thou shalt not sow thy field with mingled seed"¹¹⁸ was evidently intended to make the Judean peasant scrutinize his seed corn and eliminate adulterations, in order to get a clean crop. It was a kind of precautionary weeding. But the sorting process inevitably led to the rejection of imperfect specimens of the desired grain, and hence was an initial step in seed selection. The injunction, which is found in Leviticus, dates back to the eighth or ninth century B.C., and like other agricultural methods was probably borrowed from the local Canaanites; for the early folk tale of Ishobeth describes the door-keeper of the Israelite prince, drowsing in the noonday heat over his task of cleansing wheat for his master.¹¹⁹ The practice

¹¹⁸ *Leviticus*, XIX, 19; *Deut.* XXII, 9.

¹¹⁹ *II Samuel*. IV, 5-6 (revised version).

was still current in the time of Josephus;¹²⁰ and in the New Testament the sowing of "good seed" is stressed.¹²¹

Jewish farmers, in the first and second centuries of our era, planted seed beds for the purpose of getting a superior quality. The plain of Jericho was divided up into numerous small plots of wheat and barley; for the soil was rich on this old river terrace of the Jordan, and irrigation from spring or reservoir insured sufficient water. Elsewhere whole fields were cut up into beds, each planted with a different seed. The Jews carried on a trade in seed-corn and made purchases by tested seed or by samples, much like the little trays of wheat carried about the market by the grain merchants of ancient Athens. They tested seed by planting a few in an earthen pot or a manure bed, and judged the vitality by the rapidity of germination.¹²² This method recalls the miniature "gardens of Adonis," offered to the youthful god of spring throughout Syria from remote times. They consisted of seedling grains or vegetables raised in earthen pots by some forcing process, and may possibly have been either cause or effect of early experiments in seed testing.

The principle of seed selection emerges more clearly among the ancient Greeks. Aristotle observed that a good plant was not likely to grow from a bad seed, nor a bad plant from a good seed,¹²³ under proper conditions of climate and soil. Theophrastus voiced a general opinion of Hellenic farmers that seeds of herbs and vegetable collected from plants in their prime showed their superior vitality by rapid germination. Hence when the plants were at their best it was customary to gather the seed and dry them, since well cured seed were known to produce more fruit.¹²⁴ Theophrastus also stressed the importance of the youth of the seed: for all crops, whether grain or vegetables, the seed of the year was considered the best; next best was that of the previous year, and poorest that of the third year before. Beyond this the

¹²⁰ Josephus, *Jewish Antiquities*, BK. IV, chap. viii, 20.

¹²¹ *Matthew*, XIII, 24-30.

¹²² Vogelstein, *op. cit.*, 38-43.

¹²³ Aristotle, *De Plantis*, I, 6; II, 6.

¹²⁴ Theophrastus, *Hist. Plant.*, VII, 3, 3-4.

seed was likely to be sterile, though still suitable for food. Some exceptions to this rule depended upon the locality of production and preservation; for in high, windy regions seed seemed to retain their vitality longer.¹²⁵ Age affected the rapidity of germination also in garden plants. Fresh seed in general sprouted more quickly, though celery, beet, coriander, parsley and some others came up more promptly from older seed.¹²⁶ Moreover, the Greek farmers discovered that all vegetables were greatly improved in size and quality by transplanting; therefore they took special care to transplant those reserved for seed collection.¹²⁷ A similar tendency to coddle seed nurseries prevailed in Italy. Pliny states that cabbage plants intended for seed were never cut.¹²⁸ Cato devoted great care to his seed-plots.¹²⁹

The Greeks experimented with choice seed from different countries, in consequence of the extensive importation of over-sea grains, fruits and vegetables. For instance, a three-months Sicilian wheat was tried in Achaia, where it failed to yield a crop; but it was raised successfully in the southern part of the island of Euboeia, which was exposed to the warm, rainy south wind (Notos) of spring. Experiments with seeds from various climates and soils about the Mediterranean shores led to an interesting generalization formulated by Theophrastus: "Each seed of the several seed kinds is adapted to the natural conditions of its native habitat, both genera as compared with genera and the different species of the same genus. It is wise to transfer seed from a warm region to one a little less warm, and from a cold region in the same way. . . . Those which are transplanted from far northern lands to a hot district unfold their flower so late that they are caught by the summer drought, unless they are saved by the late rains of spring. Wherefore, according to the general opinion, care should be taken to prevent them from becoming mixed with the local variety, unless they come from

¹²⁵ *Ibid.*, VII, 5, 5; VIII, 11, 5. Compare Pliny, XVIII, 54.

¹²⁶ Theophrastus, *Hist. Plant.*, VII, 1, 6. Compare Pliny, XIX, 35.

¹²⁷ Theophrastus, *Hist. Plant.*, VII, 4, 3; VII, 5, 3.

¹²⁸ Pliny, XVIII, 62; XIX, 41.

¹²⁹ Cato, 40.

similar climatic conditions; for otherwise they are hardly suited to the new region in regard to their time either of sowing or sprouting.”¹³⁰ In regard to soil he says: “Seed, like fruit trees, ought to be brought from similar or poorer land, so that the change made is none at all or for the better. However, they maintain that seed sprung from good soil are more vigorous and maintain this virtue for two years. But differences of climate must also be considered. Seed sprung from a sunny, warm region should not be sown in a late chilly region, nor vice versa. The former come out too early and are nipped by the lingering cold; the latter too late, and perish in the heat and drought.”¹³¹ Most of these instructions anticipate the modern practice.

The Romans fell heir to the Greek attainments in the art of tillage, and carried the principle of seed selection yet farther. They recognized it as the chief means of keeping a crop true to type. “Seed though long chosen and carefully approved still degenerate unless the largest are selected year after year by the hand of man,” says Vergil.¹³² *Siligo*, a choice winter wheat, was broadly planted in the moist alluvium of Italy; but across the Alps it remained constant to type (*pertinax*) only in the fertile soil and mild climate of the middle Rhone and Isere valleys. Elsewhere in Gaul it reverted after two years to the common local variety, unless only the heaviest grains were selected for sowing.¹³³

Large and heavy seed were known to be the best. Moreover these had to be fresh, clean, free from alien admixtures.¹³⁴ Therefore wheat and barley grains which by reason of their weight settled to the bottom of the threshing floor or cleansing sieve were reserved for seed. “This is very necessary because all cereals tend to degenerate.” Moreover, only the largest and best ears of wheat and other grains were reserved for seed corn.¹³⁵ “Ears of the finest and best grain should be taken to the threshing

¹³⁰ Theophrastus, *Hist. Plant.*, VIII, 8, 1.

¹³¹ Theophrastus, *Caus. Plant.*, III, 14, 1-2; Pliny, XVIII, 54.

¹³² Vergil, *Georg. I*, 197.

¹³³ Pliny, XVIII, 8.

¹³⁴ Varro, I, 50.

¹³⁵ Columella, II, 9.

floor and kept separate from the rest, so that the farmer may have the best possible seed."¹³⁶ Ears with vacant spaces between the grains were rejected. This is the modern "ear selection." Moreover, the grains themselves were tested by color, outside and in, especially for the red and the white wheat.¹³⁷ There was a special test for lentil seed, which were often eaten by weevils, even in the pod. Therefore after the lentils were threshed they were thrown into tubs of water. The empty or weevil-eaten ones floated, and those which sank to the bottom were dried in the sun and kept for seed.¹³⁸

AMOUNT OF SEED

The amount of seed sown to the *jugerum* varied according to the soil, location, exposure to wind and sun, time of sowing and also according to the kind of seed. A good rich soil could stand heavier seeding than a poor, thin, sandy soil;¹³⁹ for the latter if too thickly sown, yielded a small and empty ear.¹⁴⁰ The average amount broadcast on medium soil was 5 *modii* of wheat, 10 of spelt, and 6 of barley per *jugerum*, or 8, 16 and 10 pecks respectively to the acre.¹⁴¹ These figures correspond fairly well with the modern English practice but exceed the American requirements when the seed are put in with the drill. The ancients themselves recognized that all seed made better growth when set or planted, than when scattered;¹⁴² and hence employed the more careful method in their seed-beds, using fewer to the plot.¹⁴³ As opposed to the average 5 *modii* of wheat per *jugerum*, 4 *modii* sufficed on loose, fertile well-drained land, but 6 *modii* were required for the less productive, dense, cretaceous soil; because a rich soil made the grain stool freely and so yielded a thick crop for a light sowing.¹⁴⁴ The thrifty Mediterranean farmer was

¹³⁶ Varro, I, 52.

¹³⁷ Pliny, XVIII, 54.

¹³⁸ Columella, II, 9.

¹³⁹ Xenophon, *Oeconomicus*, XVII, 8-11; Theophrastus, *Hist. Plant.*, VIII, 6, 2.

¹⁴⁰ Pliny, XVIII, 55.

¹⁴¹ Columella, II, 9.

¹⁴² Theophrastus, *Hist. Plant.*, VII, 5, 3.

¹⁴³ *Ibid.*, VII, 4, 3.

¹⁴⁴ Pliny, XVIII, 55.

always ready to save his seed corn; but he knew it was pooreconomy to "rob the harvest" by under-seeding his field on which much labor had been spent.¹⁴⁵ Moreover, the seed was sown thick if put in early in the autumn, because it had to wait some time for the rains before germination and would not stool abundantly; when put in later just in time for the rains, it was sown thinly "to prevent it from being suffocated," because the plants were large and thick.¹⁴⁶

Indirect testimony to the intensive character of ancient Mediterranean tillage is furnished by certain maxims that embodied old agricultural standards. The ideal was the small freehold estate, cultivated with infinite care under the master's personal supervision. The Judean national dream was every man established on a bit of land where he could rest "under his own vine and his own fig-tree," when the day's work was over. "He that hath a little garden and fertilizes it and digs it, and enjoys the produce is far better off than he who works a large garden on shares," was an ancient rabbinical comment on freehold versus tenant farming. Another was a precept for personal supervision: "He that inspects his field daily will find a stater in it."¹⁴⁷ Later Cato paraphrased this motto when he said that on a farm "the master's forehead is of more use than his back."¹⁴⁸ So also Mago of Carthage, who formulated Phoenician tillage practice in the fifth century before Christ, stated that a person buying a farm ought to sell his town house and live in the country.¹⁴⁹

In the Homeric poems, the cultivated estates of princes and kings were of moderate size, though they were supplemented by broad pasture lands which were frequently communal. The reward promised to Meleager by the people of Caledon for a great public service was "a fair demesne of 50 *guai*, the half thereof vineyard and the half open plough-land" located in the fertile Calydonian plain.¹⁵⁰ The garden of Alcinous in the little island

¹⁴⁵ Cato, 5.

¹⁴⁶ Pliny, XVIII, 54.

¹⁴⁷ Article on agriculture in *Jewish Encyclopedia*.

¹⁴⁸ Cato, 4.

¹⁴⁹ Mago quoted in Pliny, XVIII, 7.

¹⁵⁰ *Iliad.*, IX, 578-581.

kingdom of Scheria comprised four *guai*, laid out in vineyard, orchard, and vegetable plots.¹⁵¹ The question is the size of the *gues*, which apparently corresponded to the yoke of the Hebrews and the *jugerum* of the Romans, or the area ploughed by a single yoke of oxen in one day or rather half a day. It has been variously estimated as approximately half an acre by Seymour¹⁵² and as four-fifths of an acre by Ridgway;¹⁵³ but Seebohm would cut the latter estimate in half.¹⁵⁴ Hence the garden of a great king comprised only two acres, and Meleager's estate measured from 20 to 40 acres, in a time when Greece was sparsely populated. The peasant holdings in Boeotia in the eighth century B.C. were apparently very small, because Hesiod wanted only one son, that he might inherit the entire farm.

The scale of land holdings in Attica under Solon (594 B.C.) corresponds with that of the legendary period in general.¹⁵⁵ (1) The great land owner, judging from the yield of his farm, had 75 to 125 acres of grain land, or 20 to 25 acres of vineyard, or 50 to 75 acres of mixed lands. (II) The Knights forming the second class of big proprietors owned 45 to 75 acres of grain land, or 12 to 15 acres of vineyard, or 30 to 45 acres of mixed lands. (III) The Zeugites or medium proprietors owned 30 to 50 acres of crop land, allowing for the alternate years of fallow, or 7 to 10 acres of vineyard, or 25 acres of mixed lands. (IV) The Thetes had 22 acres at most if he raised grain, or 6 acres of vineyard, or 15 acres at most if he carried on mixed farming.¹⁵⁶ Thus the maximum estate in Attica was small, when the people were groaning over the appropriation of the land by the plutocrats. A century and a half later the sub-division of farm land had progressed. The paternal inheritance of Alcibiades was only 300 plethra or 70 acres, though he was accounted rich. The recorded sales of estates indicate many small plots or dwarf farms under 14 acres. The few large holdings were located on the frontier

¹⁵¹ *Odyssey*, VII, 113.

¹⁵² T. D. Seymour, *Life in the Homeric Age* (New York, 1907), 245-246.

¹⁵³ W. Ridgway, *Journal of Hellenic Studies*, VI (1885), 321-326.

¹⁵⁴ F. Seebohm, *Customary Acres* (London, 1914), 194-202.

¹⁵⁵ Plutarch, *Solon*, XVIII.

¹⁵⁶ G. Glotz, *Ancient Greece at Work* (New York, 1926), 247.

remote from Athens or in the mountains where the land was rough and fit only for forest.¹⁵⁷ One such, which became involved in a lawsuit in the time of Demosthenes, is the largest reported, and comprised about 778 acres. It had about 300 acres in barley and 50 acres in vineyards, but it also drew a large revenue from the wood carried daily to the city by six asses.¹⁵⁸ Public opinion opposed the concentration of real estate, as indicated by Plato in his *Laws*, where the maximum property should not contain more than four single lots.¹⁵⁹

It was on these small farms that the Attic farmers practised agriculture as Theophrastus observed it. The pressure of poor soil and meagre rainfall is revealed in the intensive methods there developed. Add to this the pressure of a dense urban population engaged in trade and industries, and relying on the local farmers for fresh vegetables, fruits and flowers, even though most of the breadstuffs came from overseas. Similar conditions held in various other parts of Greece and in the Aegean Islands, with similar effects upon land holdings¹⁶⁰ and tillage methods.

In contrast to Greece and Palestine, ancient Egypt at the zenith of its power doubtless approximated the arable area of 12,000 square miles which the country commands today. Land tenure on a big scale prevailed, owing both to the geographic conditions of ample fertile soil and abundant water for irrigation, and even more to the social organization of the state. But the very fecundity of the Nile Valley induced a density of population which became excessive and therefore enforced careful tillage, especially the extension of the irrigable area, against periods of famine in years of "low Nile."

In Italy again, where typical Mediterranean conditions of climate and relief prevail, tillage adjustment is apparent in the small freehold farms which were the rule, so long as the Roman

¹⁵⁷ A. Boeckh, *Public Economy of the Athenians* (trans. from the German, Boston, 1857), 88-91.

¹⁵⁸ Demosthenes, *Oration against Phaenippus* (trans. by C. R. Kennedy, Bohn Library, 1901), IV, 290-303.

¹⁵⁹ Plato, *Laws*, V, 13.

¹⁶⁰ H. Blümner, *Life of the Ancient Greeks* (trans. from the German, London, 1895), 493.

territory was small. Prior to the Second Punic War, the land allotments of the free peasants were variously two, three, seven, ten, and fourteen *jugera* of tillage land with the right of pasturing cattle on the public domain. Cincinnatus was ploughing his four-*jugera* estate on the Vatican Hill, when called to be dictator in 458 B.C. A farm of seven *jugera* or four and a half acres was considered ample for an industrious peasant by conservative Romans.¹⁶¹ This was the plebeian allotment in the early Republic and it was confirmed by the Consul Curius Dentatus in 289 B.C.¹⁶² It corresponds to the "four acres and a cow" warranted by rural enthusiasts to support the modern farmer, if he practises scientific agriculture and locates near a big urban market.

The small farm, cultivated with intelligence and industry, remained the agricultural ideal of the Romans long after rapid territorial expansion and protracted military service had undermined the little peasant freehold in old peninsular Italy. Colonial allotments did not exceed ten *jugera* or six and a quarter acres till the time of Tiberius Gracchus (133 B.C.), except in Latin colonies planted on remote, exposed frontiers. In such cases larger land grants compensated the settlers for the danger incurred. Bononia was founded as a fortified colony in 189 B.C., among the recently conquered Boii, to guard the only direct road across the Apennines by the Futa Pass, maintaining connections between Rome and the Po Valley. Hence the infantry received 50 *jugera* or 31 acres each, and the cavalry 70 *jugera* or 43 acres.¹⁶³ Similar large allotments were made at other danger points, like Aquileia at the foot of ominous Carso,¹⁶⁴ and Luna which was meant to police the Ligurian raids from the Apennines.¹⁶⁵

The agrarian law of Gracchus provided land grants of 30 *jugera* or 18.7 acres for about 80,000 Roman citizens, and thus inaugurated a larger scale of land holding for the masses. August Meitzen, on the basis of all colonial allotments in ancient Italy,

¹⁶¹ Livy, *Historia*, V, 30.

¹⁶² Valerius Maximus, IV, chap. iv, 6-7.

¹⁶³ Livy, XXXVII, 57.

¹⁶⁴ Livy, XL, 34.

¹⁶⁵ Livy, XXXIX, 1, 2; XL, 38, 41.

concludes that Roman citizens with full privileges held estates of 30 to 70 *jugera* or 18 to 44 acres, and that plebeian farms ran from 7 to 20 *jugera* or 4.5 to 12.5 acres.¹⁶⁶ These were probably the general conditions familiar to Cato, though as a big landed proprietor of this century (died 149 B.C.) he considered a 100 *jugera* vineyard (62 acres) and a 240 *jugera* olive grove (150 acres) a reasonable estate.¹⁶⁷

Yet the little peasant farm tended to revive on fertile soil in populous districts, where careful garden and fruit culture would give the proprietor a living. When a distribution of the public land about Capua and the Stellas Plain in Campania was contemplated in 59 B.C., Cicero said the land could not support more than 5000 colonists, "so as to give them 10 *jugera* apiece,"¹⁶⁸ as if that amount would suffice. On this area of 50,000 *jugera* some 20,000 citizens were settled later, according to Suetonius. Figures like these, compared with colonial grants in modern Africa and the Americas, illuminate the whole question of agricultural methods and arable area in the Mediterranean lands.

All efforts to check the decay of tillage in Roman Italy stressed the old standards of intensive cultivation. "Praise big estates but cultivate a small one" was Vergil's advice.¹⁶⁹ Pliny quotes the ancient adage that it was wiser to sow less and plough more.¹⁷⁰ Columella applied the Greek maxim of "measure in all things" to land holdings, as he enunciated the economic principle that a large farm poorly cultivated yielded less profit than a small one well tilled; and he fortified his opinion by a precept of Mago of Carthage, that a husbandman ought to be more than a match for his farm, so that when he grappled with its problems he should come out ahead in the encounter.¹⁷¹

Nature gave the ancient farmer the privilege of the struggle. Under the influences of climate and relief was evolved a system of tillage, which produced: (I) Winter grain crops maturing in

¹⁶⁶ August Meitzen, *Siedelung und Agrarwesen* (Berlin, 1895), I, 255.

¹⁶⁷ Cato, 2 and 10.

¹⁶⁸ Cicero, *Litterae ad Atticum*, A. II, 16.

¹⁶⁹ Vergil, *Georg. II*, 412.

¹⁷⁰ Pliny, XVIII, 7.

¹⁷¹ Columella, I, 3.

spring or early summer. (II) Planted crops of olives, figs and grapes ripening in autumn without artificial watering. (III) Widely distributed summer crops of fruits, vegetables and fodder plants raised by irrigation, wherever springs and perennial streams were available. The immediate material gain of this triple system was a larger and more certain total harvest and a more varied food supply than the single seasonal cultivation could have yielded. More important, however, was the economic gain, because it meant improved economic methods. It involved increased application of capital for seed, manures and the construction of irrigation canals; and it demanded an elaborate and sustained system of farm work, in consequence of which the labor power of the community was kept employed all the year round.

The economy of national wealth and the gain in national efficiency were incalculable. There was no economic leakage incident to supporting the rural labor in idleness during half the agricultural year; for Mediterranean conditions of climate and relief rendered possible a vegetative year of twelve months. Therefore Varro and Xenophon show the ancient farmer with his slaves hurrying from one urgent agricultural task to another.¹⁷² Harvest followed fast upon harvest all through summer from April to October; and the October harvest crowded upon the heels of the autumn ploughing and sowing. The days of plenty predicted by the prophet Amos, "when the ploughman shall overtake the reaper and the treader of grapes him that soweth seed,"¹⁷³ describes the ideal of productive activity in farm life, not only in Palestine but in other Mediterranean countries. Thus under the prick of Nature's goad, primitive society in these lands began early to develop a capacity for sustained labor, which was at once evidence and guarantee of rapidly advancing civilization.

¹⁷² Varro, I, 29-36.

¹⁷³ Amos, IX, 13.

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ANCIENT MEDITERRANEAN PLEASURE GARDENS

Ellen Churchill Semple

Noonday in early May on the Isthmus of Corinth. Beneath a ledge of gray limestone a ribbon of mauve shadow stretches across the narrow beach to a sapphire sea. A stiff breeze from the Hellespont tips the Aegean waves with curling crests, sucks up the moisture from the lucid air, and sends the limestone dust swirling down the white road. The sun burns face and hands as if its rays came through a lens, while the alkaline dust makes the eyes and skin smart. I creep for refuge into the purple shade beneath the ledge, blessing this "shadow of a great rock in a thirsty land," to eat my Homeric lunch of bread and wine, goat's cheese and figs.

CLIMATE goes far towards explaining those lovely pleasure gardens widely distributed in the ancient Mediterranean lands and still persisting in many places with their traditional features of confining wall or hedge, their seclusion and shade, their flower beds and ornamental fruit trees, their fountains and central pool, their sunken paths and marble seats and colonnades, their statuary and shrubbery, and the vine-grown pergola for the outdoor repast.

The Mediterranean climate encouraged the maintenance of pleasure parks and gardens, because the mild temperatures kept a succession of trees and plants in blossom all year round, brought winter blooms to the rose and almond tree even in northern Italy, and renewed the freshness of the evergreen foliage during the winter rains; hence it rewarded the labor of the cultivator and preserved the beauty of the garden in the cold season. But gardens were the boon of summer. The long, hot, cloudless months made the shelter of vine-grown arbor and cypress avenue a welcome refuge. When the thirsty etesian winds swept down from the north or the sirocco from Africa, only the garden kept moist and green and fresh. Eyes tired by a relentless sun and its reflection from the limestone roads rested gratefully upon the dark foliage of laurel or oleander. When the stifling afternoon passed and the people issued from their darkened houses, the garden paths invited to leisurely strolls. In the Paradise legend Adam and Eve heard "the voice of the Lord God walking in the garden in the cool of the day," after the custom of Palestine and other Mediterranean lands. Likewise Ammon Ra "walked abroad" in his temple garden at Thebes, where Queen Hatshipsut had planted myrrh trees imported from distant Punt.

But other factors, social and economic, contributed to the development of these ancient gardens: early concentration of population

in cities, expansion of trade and the accumulation of wealth, stimulation of civilization by commerce, growth of a cultured leisure class, with its concern for the amenities and luxuries of life. A more potent factor still was the rapid advance of agriculture till it attained the aesthetic stage, crowning evidence of its intensive character.

The cultivation of land for the mere embellishment of life is a frequent concomitant of intensive tillage, even when scant arable area makes such use of the soil seem extravagant. It is conspicuous in warm countries, where an open-air life is possible, but appears also in less exuberant form in colder countries that have a long growing season like England. As a native growth it meets us in modern Japan, the Hawaiian Islands, and other islands of the South Seas, in ancient Persia and Babylonia, in Kashmir and northern India under the Mongol rulers, and at the other side of the world in ancient Mexico. All these countries developed intensive agriculture, and all had to rely wholly or in part upon irrigation to secure an adequate food supply.

Ornamental gardening became a feature of ancient Mediterranean civilization. It began at the eastern end of the basin at an early period and advanced westward in the wake of trade and colonization. Everywhere it took root and became the fine efflorescence of that patient, tireless tillage of the region. It grew out of the widespread fruit, flower, and herb culture, which in greater or less degree depended upon summer irrigation. The pleasure gardens originated in walled orchards and vineyards, in plantations of flowering pomegranates, quinces, plums, and apricots, in groves of stately date palms, all with their irrigation pools and canals. The spaces between the rows of trees, for the more economic use of the precious soil, were often planted with flowers at once useful and beautiful, like the saffron-yielding crocus or the edible poppy, or "the henna flowers in the vineyards of Engedi," or the violets, iris, and roses of Boeotia, Cyrenaica, and other lands for the manufacture of perfumes and unguents.

The bloom and fragrance of the grape, pomegranate, and the nut tree were prized by the ancient Jews, as were the fruits. "I went down into the garden of nuts to see the fruits of the valley, and to see whether the vine flourished, and the pomegranates budded." Orchards and vineyards provided certain essential elements of the pleasure garden—blossoms, fragrance, and especially shade. Hence the ancient Mediterranean gardens, in their long development, employed vine-grown trellises, fruit trees, alleys of shade trees, and masses of shrubbery, and relied for artistic effects only in part upon flower beds. Even then they preferred the flowering shrubs, like myrtle, laurel, and oleander, masses of green picked out with pink or white. The aesthetic value of the ripe fruit was never discounted.

In point of size the ancient gardens varied from the ample palace grounds and parks of kings—which, however, reached only moderate

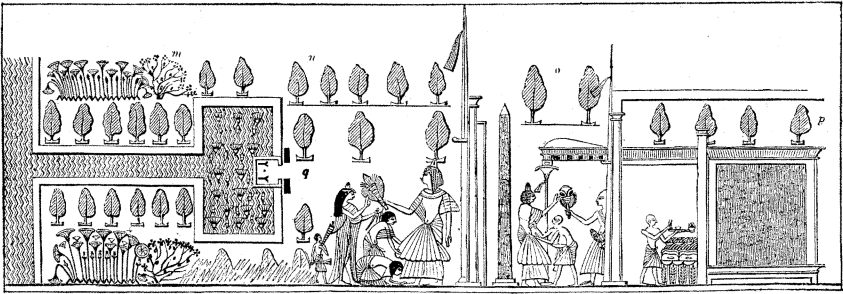


FIG. 1.—Theban villa with garden. (After Wilkinson: *The Manners and Customs of the Ancient Egyptians*, 1847, Vol. 2, Fig. 116, p. 129.)

proportions as a rule—to the private garden, whose size depended on its location and on the means of the owner. In the size of gardens one seems to detect everywhere a certain restraint probably due to the high cost of land and of irrigation. Water theft from the public aqueducts was a common offense among Athenians and even the wealthy landed gentry of the Roman suburbs. The typical private garden was small, even diminutive. It lay near the house and formed an outdoor extension of it; here much of the family life was led. The master could step from drawing-room or dining room to flower-bordered terrace or shaded path. Resting on a marble bench or walking beneath a colonnade, he commanded a view of the whole. Its small size encouraged complete cultivation and ample use of water and did not necessarily lessen its beauty. A little garden dedicated to Eros is made to speak for itself in an anonymous Greek poem: "I am not great among gardens, but I am full of charm."

This small scale was yet further reduced in the exquisite miniature gardens planted in the peristyles of Greek and Roman houses in the century before the Christian era or perhaps earlier. The peristyle garden still survives in the Spanish patio with its arcade, central fountain, myrtles, pomegranates, jasmines, and palms growing in earthen jars. In the eastern Mediterranean it survives also in the spacious court of the typical Damascene residence, whose tessellated floor is broken in the center by water basin and fountain, surrounded by flowering plants. Orange, lemon, and pomegranate trees afford rest to the eyes. The fragrance of jasmine fills the air and penetrates to the recessed colonnade or *liwan*, where couches look out upon the enclosure.

In contrast to the small private gardens were the sacred groves and temple grounds. These also, like the peasant's orchard, felt the transforming touch of the gardener and became beautiful parks. The Temple of Jerusalem was an exception, because the Jews feared that trees in the courtyard might savor of the hilltop groves of Baal.

The summer drought dictated the introduction of water as an

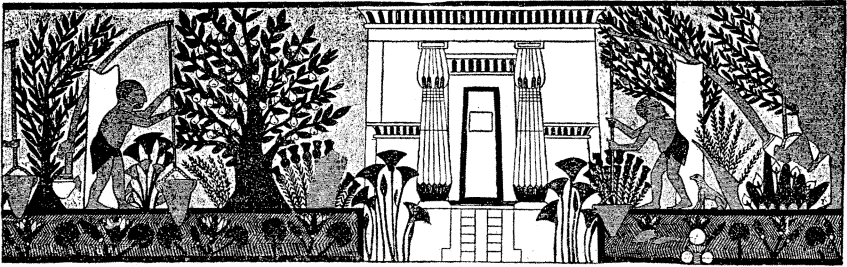


FIG. 2—The garden of Apoui, Thebes. (After *Mémoires publiées par les membres de la Mission archéologique française au Caire*, Vol. 5, 1894.)

unfailing feature of the garden. It was handled as an artistic motif in countless ways. It was conducted about in stone, cement, or tiled runlets; it emerged from some decorative opening in a terrace wall or issued in jets from a statue; it was collected in fishpond or lotus pool; it flowed from artificial grotto or leaped from a rocky ledge into a marble basin. Moreover, the irrigation canals with their secondary furrows necessitated a regular system, which tended to throw the garden plan into geometric forms. The modern oriental garden always seems dominated by the irrigation scheme on which its life depends. In the exquisite Indian gardens seen about Jaipur and Amritsar the water conduits dictate the basic lines of flower beds, tree plots, and pools, just as they do in the garden plans depicted on ancient Egyptian tombs.

The same thing is true of the Persian rose gardens which in Shiraz today reproduce the ancient garden pattern. An old description of a sixth-century Persian rug shows the design of a pleasure garden, planted in fruit trees and flowers, crossed by straight paths and irrigation conduits, while the border represents long flower beds. Persian garden rugs of 1600 and later show the traditional design—a central water basin with fish and ducks, canals leading thence in formal arrangement, narrow paths along the canals, cypress alleys or slender flower beds in the border, trees and shrubs growing in vases, while the weave in the streams resembles “watered ribbon.”¹ The whole arrangement is rectilinear, reproducing the Persian garden plan as necessitated by irrigated horticulture in a semiarid land.

Like their Persian prototypes, the Mediterranean gardens were for the most part formal and architectural in style. They were not an idealized landscape like the English park, or a miniature landscape like the Japanese garden. They had no place for winding paths or pools with the sinuous outlines of natural shores. Back of the garden we see the engineer with his problems of hydraulic pressure, his

¹ See Marie Luise Gothein: *Geschichte der Gartenkunst*, Vol. 1, Jena, 1914, Fig. 102, p. 150. Volume 1 of this admirable work deals with the development of gardens from ancient Egypt to the Renaissance in Italy, Spain, and Portugal and is richly illustrated. An English edition of the work is now available, New York, 1929.

traditions of durable and economical construction, even when pursuing aims of beauty, and his architectural skill in utilizing the small space at his command.

So much for the general conclusions. A survey of the ancient Mediterranean gardens according to countries will demonstrate the truth of these conclusions and show the types that developed in various regions, owing to local differences of geographic, economic, and social conditions.

Paradise, that garden which "the Lord God planted eastward in Eden," was modeled upon the gardens found in all irrigated lands from Persia to Palestine; and it became a prototype of the flowery retreats of Mediterranean civilization from Damascus, Jerusalem, and Antioch in the East to Spain and Granada in the West. The river that watered Paradise was divided into several channels, after the manner of "the shorn and parcelled Oxus," the Nile, and other irrigation streams. The garden contained "every tree that is pleasant to the sight, and good for food." The tree of knowledge and the tree of life were rare exotics introduced by the early dram-



FIG. 3.—A Persian garden. (From an early sixteenth-century miniature in the Cochran Collection, Metropolitan Museum of Art, New York.)

atist who staged here the first great tragedy of man.

The desert Arabs, who skirted the high rim of the Mediterranean Basin from Moab to Hermon and looked down on the irrigated gardens of Damascus and Ramoth-Gilead, pictured their paradise as a pleasure garden abounding in fountains of pure water. There in the noonday heat the saints reclined on silken couches spread in deep shade and enjoyed the fruits always ripe on the trees. It was the Garden of Resort in the Koran, the Garden of Eden, the Garden of the Most High with everything to satisfy the taste and delight the eye. "Close down upon them shall be its shadows and lowered over them its fruits to cull." Though the Arab paradise waited for the pen of Mohammed, it belonged of old to the Semites of desert and grass-land; it doubtless lived in Arab poetry, ages before the seer of Mecca.

GARDENS IN PALESTINE AND SYRIA

The oriental models found apt imitators in Palestine, Philistia, Phoenicia, and northern Syria, where geographic conditions encouraged their introduction and further development and where the rich and powerful maintained large estates; but the Judean peasant enjoyed his leisure beneath his own vine and fig tree or raised a few flowers in his herb garden. King Solomon had his pleasure park near Jerusalem, whither he was wont to go in the morning, Josephus tells us. It was laid out in fine gardens and abounded in rivulets. The author of the Song of Solomon described an ideal garden to which he compared his beloved. A high wall ensured its privacy, and it was watered by a never-failing spring. Almond trees raised their crowns of pale pink blossoms. The scarlet fruit of the pomegranate trees punctured the dark foliage with points of light. There were beds of narcissus, crocus, henna, and all the other aromatic plants that could be made to grow, while the blossoming grapevines gave forth their perfume. "Awake, O north wind; and come, thou south; blow upon my garden that the spices thereof may flow out."



FIG. 4—A Persian garden. (From an early sixteenth-century miniature in the Cochran Collection, Metropolitan Museum of Art, New York.)

The Bible in figurative language indicates the beauty of these gardens, specifies their trees and flowers, and suggests their wide prevalence. The Garden of Eden is the synonym for earthly beauty and productivity. Jehovah, placated after one of the habitual backslidings of His people, promises to convert the desert into a tree garden: "I will plant in the wilderness the cedar, the shittah tree [acacia], and the myrtle, and the oil tree; I will set in the desert the fir tree, and the pine, and the box tree together."

In the Book of Ecclesiasticus, Wisdom compares her glory to the beauties of a garden—to the cedar of Lebanon, to the cypress of Mt. Hermon, to the palm and the olive and the plane, to the wide-spreading terebinth tree, to the blossoming grapevine, and the roses of Jericho.

From her issue pleasant odors like the fragrance of spices and sweet-scented shrubs. She invites all to come and eat of her fruits. Then the figure of speech shifts to another feature of the garden: "I also came out as a stream from a river, and as a conduit into a garden. I said, I will water my garden, and will water abundantly my garden bed; and, lo, my stream became a river, and my river became a sea." So full flow the wellsprings of wisdom.

In the city of Jerusalem the royal rose garden alone was allowed, because no dung might be brought within the walls; outside, practical considerations probably dominated, though the introduction from Greece of laurel, iris, ivy, mint, narcissus, box, and rue indicates an aesthetic motive. Under Greek and Roman rule, when peace brought plenty, the environs of Jerusalem blossomed with gardens, orchards, and olive groves. A wide stretch of these north of the Wall of Agrippa was destroyed by Titus in 71 A. D. during the siege of the city. On this side opened the Gate of Gennat or Garden Gate. East of Jerusalem, on the Mount of Olives, lay the Garden of Gethsemane, much frequented by the citizens. When the April sun ripened the fields of barley and the first blast of the sirocco heralded the Feast of the Passover, thither the men of Jerusalem, escaping from the city's heat, would resort for nightly promenade. One such group of friends, one such night, made this little pleasure park a synonym of agony. Another such garden near the hill of Golgotha received the body of the dead Christ. The ancient Jews used these green enclosures as family burying grounds, in which a natural or artificial cave served for the sepulcher.

Semitic garden technique was early perfected in Syria, because this land, more than Palestine, was constantly subjected to Persian influences, both through trade and conquest. There the imperial rulers established royal parks, where the cedars of Lebanon grew larger and finer than on their native mountains. The palace of the Persian governor of Northern Syria, at the source of the little Dardes River between Aleppo and the Euphrates, had a "beautiful garden containing all that the seasons produce," but it was destroyed by Cyrus the Younger in 401 B. C.

Throughout Syria and Palestine the groves on hilltops, consecrated by the native Semitic population to the worship of Baal and the generative forces of nature, seem to have been improved by cultivation. These groves were sometimes found growing about high-laid springs, which later were distributed into water conduits, or they were planted as acts of devotion near a spring or well. The sacred trees were the oak, tamarisk, poplar, palm, and terebinth, all which were improved or maintained by irrigation. As the groves were gradually provided with altars and finally with temples they became converted into gardens.

The native Canaanites and Phoenicians dedicated these gardens with obscene rites, but the Israelites also frequented them and thereby provoked the denunciations of the prophets. Such probably was the sacred grove and temple of Astarte, located at the springs of the Adonis River (Nahr Ibrahim) below the crest of the Lebanon Mountains. Here the people of Byblus and neighboring Phoenician cities



FIG. 5—The Garden of Gethsemane. (Photograph by James Ricalton, courtesy of *American Forests and Forest Life*.)

celebrated every spring the death and resurrection of the nature god Adonis, youthful lover of Astarte (Aphrodite). Here the red anemone, dyed in the blood of the slain god, bloomed amid the cedars and walnut trees, and here the mourning worshippers sacrificed the miniature "gardens of Adonis," which figured in his rites as practiced in western Asia, Alexandria, and Greece. They were small baskets or earthen pots planted with wheat, barley, fennel, lettuce, and various flowers; epitomes of field and garden, sprouting and withering in eight days, they typified the ephemeral life of spring vegetation. Adonis worship prevailed also in contaminated Jerusalem, where Ezekiel saw the women wailing for the god in the temple gate. Isaiah describes the short-lived gardens which were placed before the images of Adonis, exactly as one sees them today in the Catholic churches of Italy on Good Friday, the vernal memorial of the dead Christ.

The Phoenicians were commercial nurserymen in Homeric times. Their cargoes included plants and trees, useful and ornamental, which were disseminated over the whole Mediterranean from their native habitats in the East and early became commodities of general international trade. This process stimulated horticulture, spread informa-

tion as to methods of cultivation, or led to large-scale experiments in acclimatization. It is possible to follow the introduction of the peach from Persia into Egypt, thence into Rhodes where the tree long sulked and refused to bear, and finally into Greece and Rome.

EGYPTIAN GARDENS

Phoenicia and Palestine, through centuries of commercial and political affiliation with Egypt, drew suggestions for their horticulture

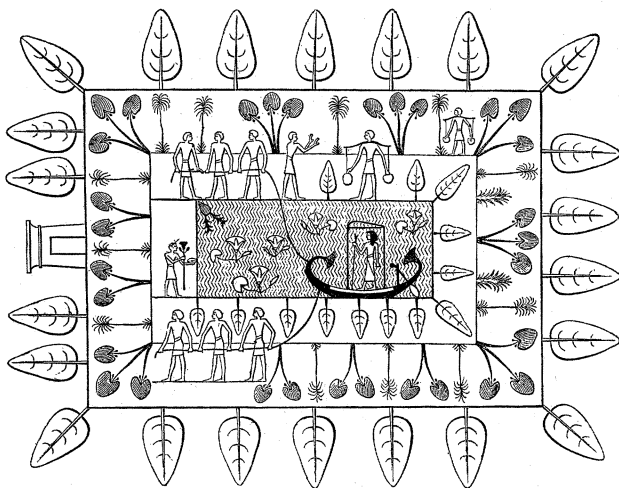


FIG. 6—Painting on a tomb at Thebes. (After Wilkinson: *A Popular Account of the Ancient Egyptians*, 1871, Vol. 1, Fig. 27, p. 25.)

also from the Nile Valley. There all conditions encouraged the early development of pleasure gardens—careful agriculture, a long, hot summer and the need of escape from it, demand for flowers in the worship of nature gods like Isis and Osiris, and finally the presence of a rich and refined leisure class. The Egyptian pleasure garden never lost the marks of its origin in orchard and vineyard and of its conformity to the requirements of irrigation.

Formal gardens existed in Egypt in the Fourth Dynasty (2800 B. C.). In the Eighteenth Dynasty garden technique was fully developed and beautified the country and city houses of the wealthy. Local plant resources no longer sufficed; incense trees and other exotics were imported. A garden of this period, depicted at Thebes, shows a walled enclosure laid out in eight sections. The middle section is occupied by a long grape arbor shading a path to the dwelling. Near by are two water basins with pavilions on their margins, lotus flowers floating on their surface, and ducks swimming about. Two other rectangular tanks, bordered by avenues of alternate palms and fig

trees, occupy the front part of the garden. An artistic balance marks the composition of the whole.

A picture in a high priest's tomb at Tel-el-Amarna shows a complex of buildings, comprising his residence and the storehouses of the temple,

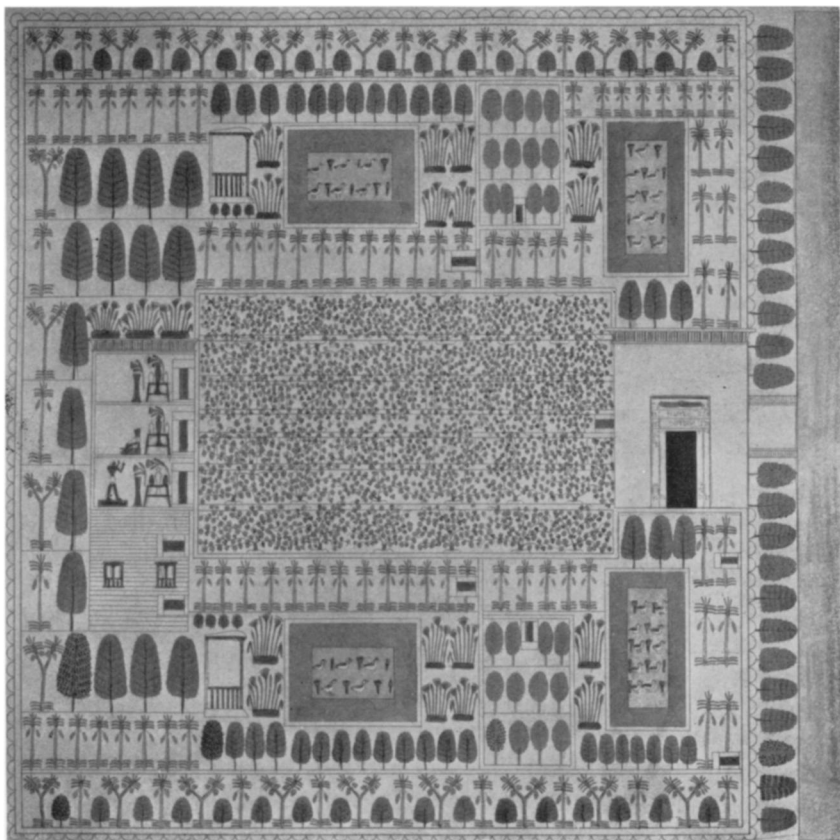


FIG. 7—Painting in a tomb representing the garden of the commander in chief of Amenophis III, Thebes. (After Ippolito Rosellini: *I Monumenti dell' Egitto e della Nubia, Monumenti civili*, Vol. 2, Pisa, 1834.)

all surrounded by a garden. Trees set in depressions to hold water fill the spaces between the buildings. A palm garden has a square tank or pool in the center, around which other trees are planted in formal lines. A flight of steps leads down to the water, while a kiosk overlooks the pool. This is a recurrent feature in Egyptian gardens. A villa garden depicted on another Theban tomb has the usual combination of canal, water basin, shady avenues, and flower beds but in addition shows an awning stretched over the entrance of the dwelling and projecting into the garden to form an outdoor room.

Flowers were used profusely in the social and religious life of the

ancient Egyptians. At banquets they decked both table and guests. The guests wore lotus buds in their hair and held out the open blossoms to one another to smell. Garlands festooned the wine jars. Bouquets were offered to the gods; wreaths encircled the necks of sacrificial geese and bulls and covered the mummy cases on their way to the tomb. Finally, according to a love song of the Turin papyrus, a garden is the trysting place of two lovers; and there beneath a wild fig tree they meet "on the festival of the garden." One is reminded inevitably of Japan with its national flower festivals and its passion for gardens.

GREEK GARDENS

In contrast to the explicit testimony on aesthetic gardens left by Egyptian tombs and papyri, evidence of development of private gardens in Greece is fragmentary and meager till Hellenic culture has passed its zenith: then the references become abundant. The pseudo-Platonic dialogue "Minos" alludes to authoritative books on gardening which have vanished. But there is ample evidence of a highly developed garden technique, which beautified the temple groves with flower beds and fountains and converted prosaic orchards into recreation parks.

The Greeks, like the Hebrews, show a love of gardens in their mythology. As companion piece to the Garden of Eden, they give us the Garden of Hesperides, located in a fabled island of the far west. Pindar describes its beauty:

There round the Islands of the Blest,
The Ocean breezes blow,
And golden flowers are glowing,
Some on trees of splendor growing
And some the water feedeth.
Fair wreaths they yield, wherewith
The happy ones do twine their hands.

The garden of Alcinous, though planted for practical purposes, reveals a sense of horticultural beauty. "Without the courtyard hard by the door is a large garden covering four acres; around it runs a hedge on either side. Here grow tall thrifty trees—pears, pomegranates, apples with shining fruit, sweet figs, and thrifty olives. On them fruit never fails; it is not gone in winter or in summer but lasts throughout the year. And here trim garden beds, along the outer line, spring up in every kind, and all the year are gay. Near by two fountains rise, one scattering its streams throughout the garden, one bounding by another course beneath the courtyard gate toward the high house."

From such farm gardens developed the Greek pleasure garden. Flowers were raised on all country estates to provide "decorations for altars and statues and wreaths of beauty and fragrance for the person." They were the chief crop in industrial gardens, which sup-

plied the maker of perfumes and unguents. Those in Cyrenaica were famous because the semiarid climate made the roses, violets, and crocuses more fragrant than elsewhere. Such commercial nurseries doubtless stimulated aesthetic horticulture, which was also aided by Alexander's conquest of western Asia; for the victors returned with new fruits like the citron, with new plants, and with countless Semitic



FIG. 8—Mural painting in the palace of Knossos representing boy gathering crocuses or saffron for a religious ceremony or feast. About 1800 B. C. The original is in the museum at Candia. A reproduction in color appears in Sir Arthur Evans's "The Palace of Minos," Vol. I, 1921. (This reproduction is from Plate 26 of Rostovtzeff: *A History of the Ancient World*, Vol. 1: *The Orient and Greece*, 1926, by permission from the Oxford University Press.)

slaves trained in garden technique; finally they were filled with enthusiasm for the numerous Persian paradises they had seen.

But Greek gardens had appeared in Athens before this. Aristophanes mentions "fragrant gardens" injured by insects; vine-grown gardens where the birds picked the berries of the myrtle, poppy, and sesame; and sweet violets growing by a fountain in a garden. Such allusions are short and casual, but they indicate quiet green retreats like that Lesbian Garden of the Nymphs described by Sappho (600 B. C.):

Through orchard plots with fragrance crowned
The clear cool fountain murmuring flows,
And forest trees with rustling sound
Invite to soft repose.

We hear more of private gardens which were thrown open to the public and therefore figured in the common life. Cimon of Athens, general during the Persian War, pulled down the walls of his garden and grounds in order that his fellow citizens might share the fruit. Plato, Epicurus, and Theophrastus bought land and planted gardens

to be used for schools of philosophy, and they came to rank among the glories of Athens.

The architecture of the Greek dwelling, with its open peristyle court, suggested the interior garden as a natural accessory; yet in Homeric times and long afterward this court served as an outdoor workshop. Where or when it first came to be planted and beautified is unknown; for this evanescent art of flower and shrub would leave few traces. Yet the remains at Herculaneum and Pompeii reveal the perfect development of the peristyle garden in Greco-Roman houses of the first and second centuries before the Christian era. Vitruvius describes the Greek drawing-room in the Cyzicene style of house as facing north upon gardens in the rear and having windows like folding doors, so that the garden view might be unobstructed. To this and later periods belonged the perfected house garden of the widespread Greek cities. These were small and exquisite, rigidly symmetrical, and adorned with colonnades and statuary. Shade trees and fountains cooled the air; beds were planted each with a separate kind of flower, lily or rose, violet or crocus, lest the large should rob the small of its nourishment. Gardens by the sea had lagoons and navigable channels, in which grew marine plants, encircled by native trees and shrubbery.

It was in their public parks, however, that the democratic Greeks developed their national talent for landscape gardening. These grew out of the sacred groves, transformed by every means of enhancing natural beauty known to the Greeks, and devoted to popular recreation and exercise. The Academy of Athens, outgrowth of Athene's sacred olive grove in the Cephissus Valley, was repeatedly beautified by tyrants and statesmen of the city. Hipparchus surrounded it with walls in the late sixth century before Christ, and Cimon embellished it with walks, trees, and fountains. Here were alleys of elm and plane, "sunless at noon," nightingales singing in the deep coverts, groves of laurel and olive, narcissus and crocus blooming abundantly beside the irrigation rivulets. Thus Sophocles knew it, as later did Plato and his followers. Gymnasia and palaestrae were places not only of training but also of recreation; and their plantations of trees, shaded walks, and fountains attracted young and old. The ground plans of gymnasia excavated at Delphi, Priene, Epidaurus, and Pergamum indicate that landscape gardens occupied the peristyle enclosures. Even prosaic Sparta located its wrestling ground in the Plane-Tree Grove on an island in the Eurotas River.

The sacred groves of forest trees, which antedated temples, were gradually improved by cultivation, diversified by ornamental trees and plants, and adorned with marble altars and fountains; for springs were invariably present, whose nymphs were honored. Fruit trees contributed their beauty and yielded revenue. Strabo says that "flowery groves" surrounded the temples to Artemis, Aphrodite, and the nymphs

in the Alpheus Valley about Olympia. Here Xenophon built a temple to Artemis in an orchard. Pindar speaks of the "pleasant garden" surrounding Aphrodite's temple in Cyrene, where the Greek colonists maintained consecrated groves. Finest of all was the Garden of Daphne, sacred to Apollo, near the city of Antioch. It was famous for its laurel and cypress trees, its fountains and streams, and its shining temple of Apollo, whose sumptuous festival was held every August.

A motive for the introduction of flower gardens into the sacred groves lay in the demand for a particular flower in the cult of each deity. Aphrodite was the "violet-crowned" protector of blooming gardens. Sacred to her also were the rose and the bridal myrtle with its fragrant white blossoms. The laurel tree with its clustered bloom, essential in the worship of Apollo, was always planted near his temples. Laurel and myrtle were not native to the Crimean shores of the Euxine; the Greek colonists there tried by every known art to grow them for religious purposes, but in vain. They succeeded in raising figs and pomegranates, whose foliage and fruit graced many a Mediterranean garden, but had to cover the trees in winter.

Greek settlers on distant Mediterranean shores were constantly reclaiming some new spot to beauty. Colonists on the Asia Minor and Syrian coast were doubtless stimulated thereto by contact with the Persians. Tissaphernes, Persian satrap of Lydia during the Peloponnesian War, had a park, "a place charmingly wooded and watered, with delightful walks and summerhouses." Antioch was laid out by Seleucus Nicator on a magnificent scale with boulevards planted in flower gardens, which were bordered by colonnades and ornamented with marble pavilions, baths, and fountains. From the west gate of the city an avenue led through a suburb of garden-set villas, vineyards, rose gardens, and groves to the Park of Daphne. The Ptolemies laid out a succession of fine public gardens in Alexandria about the museum and gymnasium; the latter had porticos six hundred feet long enclosing a shady court.

The social conditions of Hellenic Syria and Egypt, which assured wealth to the ruling class, recurred among the colonial Greeks of Sicily and there too resulted in a display of gardens. Gelon, tyrant of Syracuse (476 B. C.), had a royal park of great beauty. It was well irrigated and contained a wonderful "Horn of Amaltheia," a plot of blossoming fruit trees and flower beds, accounted a masterpiece of the gardener's art. Hiero II of Syracuse achieved the fantastic in horticultural art. On the upper deck of a monster pleasure ship he laid out a roof garden, which was provided with walks, pergolas, and arbors covered with ivy and grapevines; shrubs and flowers were planted in casks of earth to complete the effect.

The use of flowers runs through all Greek life. Every dwelling

seems to be in touch with some garden. The people have the tender feeling for flowers that characterizes one who has cultivated his own garden. In all their public celebrations and in their common daily life the Greeks made an extraordinary demand for flowers, which expert florists supplied all the year round. There was a regular succession of blooms, from the white violet of mild days in winter and the early plum to the autumn flowers which, when planted in sunny and protected spots, prolonged their season far into the winter.

"Violet-wreathed Athens" had daily flower markets where many

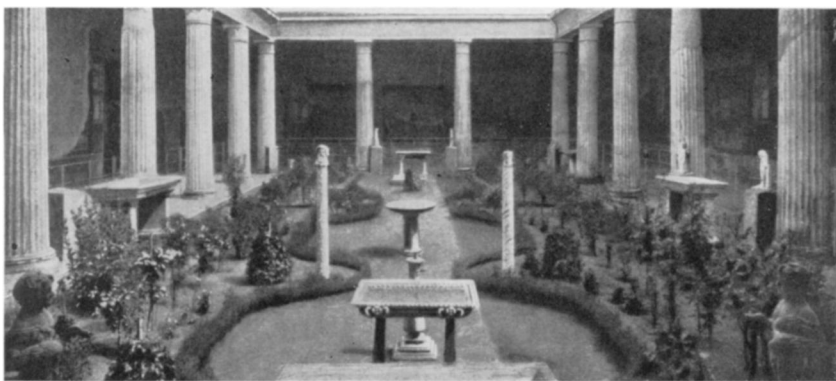


FIG. 9.—Restoration of the peristyle garden in the House of the Vettii, Pompeii.

varieties of roses and violets were sold, besides phlox, hyacinths, narcissus, iris, lychnis, myrtle, lilies, anemones, crocuses, and numerous sweet-smelling shrubs. Flower girls went from house to house, offering their wares for sale or filling a regular order as if they were delivering milk and eggs. Flowers were cultivated in market gardens in the suburbs. Roses received special attention. The bushes were transplanted frequently and were cut back to prevent deterioration of the bloom; or they were burnt back—a treatment known to some modern European florists.

The Greeks constantly varied the native supply of garland flowers by foreign importations and domestication of wild species. They knew which countries produced the finest and most fragrant varieties, but they experienced difficulty in growing these in an alien climate and soil. Domestication presented similar problems. A species of wild thyme was transplanted from the mountains and cultivated at Athens and Sicyon; but as wood plants were often sterile under domestication, considerable art was required to propagate them. A remarkable hundred-leaved rose was grown at Philippi in eastern Macedonia. It had been domesticated from a many-leaved variety which grew wild on the slopes of Mt. Pangaeus near by. As this coast had been the scene of early Phoenician settlement from the neighboring

island of Thasos, one surmises that this rose of the Macedonian hills was perhaps an exile from some far Sidonian garden. Or it may have been derived from the garden attributed to Midas by Herodotus, "in which wild roses grow, each one having sixty petals, and surpassing all others in fragrance."

ROMAN GARDENS

The practical Romans, for centuries a race of farmers, reveal the slow evolution of aesthetic horticulture from the merely economic;

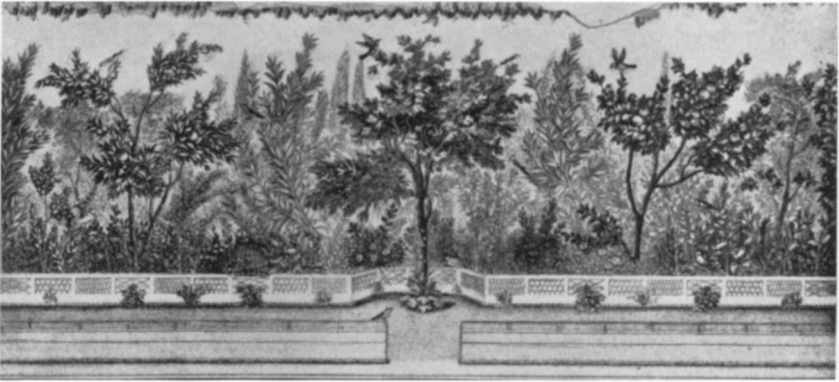


FIG. 10—Restoration of a garden fresco in the House of Livia before the Porta Prima of Rome. (*Antike Denkmäler*, Vol. 1, Berlin, 1891, Pl. 24.)

eventually they gave it the final touch of beauty and magnificence. In ancient Latium, as in Greece, the garden was part of every farm. Primarily for fruits and vegetables, it included also flowers for the garlands used in ceremonies. An ancient scene reported by Roman tradition is that of Tarquinius Superbus (534 B. C.) in his garden showing a perturbed official how to handle a threatened revolt, by silently striking off the heads of the tallest poppies as he sauntered down a path. Cato the Elder (d. 149 B. C.) states that every farm garden should contain flower beds and ornamental trees, like the nuptial myrtle, the Delphic and Cyprian laurel, and that it should be laid out near the house.

Two centuries later Columella, in his "*Carmen Hortorum*," describes the garden of a large estate, emphasizing the flowers, which he calls "those earthly stars . . . the violet beds unfold their winking eyes . . . the rose abashed with modest blush unveils her virgin cheek," "the horned poppies with their wholesome fruit and poppies which fast bind eluding sleep," "plants of a thousand colors." This is a farm garden. Its flowers, along with vegetables and fruits, are packed into white osier baskets and sold in the nearest market town. The flower trade pays, for "the vendor, with staggering

pace and soaked with wine, joyfully from town returns, weighed down with cash."

The demand for flowers increased with increasing luxury in the late republic and the empire. In early times public benefactors were honored by simple chaplets of leaves; later, crowns of blossoms became customary. From Rome's early days garlands decorated the temples of the gods, the domestic Lares, and the sepulchers; but later in private life their use increased. At banquets roses were scattered on the

tables and crowned the guests. "Let not roses fail the feast, nor lasting parsley, nor the lily soon to die."

Horace states that in his time flower gardens had become a great national indulgence, displacing field crops. The territorial expansion of imperial Rome caused an economic



FIG. 11.—The Mausoleum of Augustus turned into a garden. (After Lanciani: *The Ruins and Excavations of Ancient Rome*, 1897, Fig. 182, p. 463; courtesy of Houghton Mifflin Company.)

reaction upon production in Italy, a reaction that was strong and immediate, owing to easy maritime communication between Rome and remote parts of her empire. The importation of provincial grain into Italy discouraged agriculture and interrupted the normal evolution of tillage. But a partial readjustment followed when Roman farmers concentrated on intensive garden and fruit culture and thus specialized in products that were proof against foreign competition. The change stimulated the finer aspects of horticulture, while increasing population and wealth multiplied the demand for the rarer products, whether flower, fruit, or vegetable. Thus an improved floriculture constantly enlarged the element of beauty in the Roman kitchen garden.

Furthermore, increasing contact with Greeks and Asiatics, who already had a highly developed horticulture, and the growing wealth of the patrician and equestrian orders at Rome combined to make the pleasure garden the fashion in Italy. Riches and slaves poured into the country from the eastern provinces. A force of expert workmen was at hand just when a cultured capitalistic class at Rome was looking for new and refined enjoyments and when the wear and tear of city life and the excitement of political campaigns drove the wealthy to provide rural retreats for themselves. They began to convert old

farms into country estates with shady groves, formal garden, and summer dining room in marble pavilion. Or they built smaller suburban villas, each with its pleasure garden, like that of Diomedes near Pompeii and of the Younger Pliny at Laurentum. The millionaires laid out their gardens in the city and there, within enclosing walls,

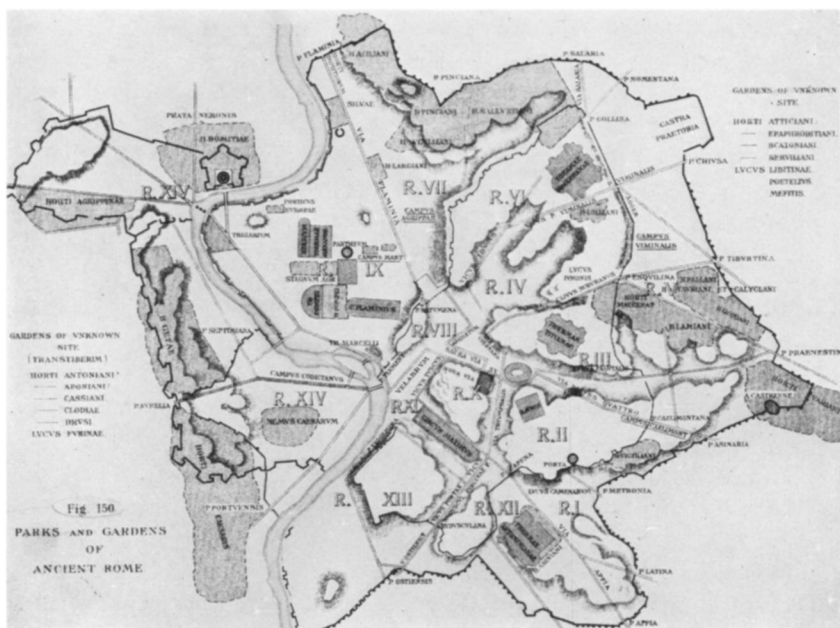


FIG. 12—The parks and gardens of ancient Rome. (Reproduced from Lanciani: *The Ruins and Excavations of Ancient Rome*, 1897, Fig. 150, p. 394; courtesy of Houghton Mifflin Company.)

made their green retreats. The building of villas became a passion among the Romans. Cicero, in addition to his ancestral estate at Arpinum, bought seventeen others which he improved and occupied from time to time. Lucretius, writing in 61 B. C., pictures the restless high-class society of his day vibrating between town and country house.

Private pleasure gardens therefore abounded within and without the capital. A map of imperial Rome shows them extending over the hills for two miles or more on both sides of the Tiber, almost encircling the city with a wreath of green. The significant fact of their distribution is their paucity within the old city of the Seven Hills enclosed by the Servian walls and their great number and expanse immediately outside them. The inner city, even in imperial times, contained only the garden of Lollia and part of the garden of Maecenas.

The outer girdle of green comprised the Pincian Hill, the ancient *collis hortorum*, where lay the gardens of the Acilian family and Pompey, the sumptuous gardens of Lucullus which later became the

haunt of Messalina, and the beautiful grounds of the historian Sallust, which in the Italian Renaissance became the site of the famous Villa Ludovisi. The green belt curved east and south through a long series of gardens, most famous of which were the *Horti Maecenatis*. These were laid out above an old potter's field and dumping ground of the Esquiline Hill, which Maecenas covered with twenty feet of earth and converted from a plague spot into a place of beauty. The low plain west of the Tiber and the slopes of the Janiculum and Vatican Hills were covered with imperial gardens. Lanciani estimates that the capital under the Caesars had one-eighth of its area laid out in gardens and therefore was provided with lungs as are few modern cities.

We have scant data as to the size of the gardens. Those of the emperors and nobles were undoubtedly large, like that of Maecenas, which measured about 1000 by 300 feet, some seven acres. However, this area included the palace and various other buildings which constituted a rich establishment; so that the planted spaces were probably small. The ruins of the imperial palace on the Palatine Hill contain traces of a formal garden two acres in extent, measuring 525 by 156 feet. These gardens were large, considering their location within the city; but one represented wealth, and the other imperial power.

The famous porticoes and gardens of the Campus Martius presented a total length of over three miles of covered walk and sheltered an area of about six acres; but they enclosed garden spaces amounting to sixteen acres. The *Porticus Liviae*, which Augustus laid out as a public garden on the Esquiline Hill, has left remains sufficient to indicate its size and character. It was a sunken parterre two acres in extent (377 by 246 feet), approached by a flight of steps from above and surrounded by a double colonnade which overlooked the central garden space. This isolated *Porticus* was probably typical of those in the Campus Martius and suggests a taste for small and finished garden plots even as public parks.

Outside the city the gardens were large wherever wealth abounded. Magnificent villas with beautiful grounds were distributed along the main highroads within easy chariot ride of the capital. They occupied all the choice sites in the Alban Mountains, an old volcanic region of fertile soil, deep woods, lakes and springs, fifteen miles southeast of Rome. High up on the northern slope, above modern Frascati, Cicero had his Tusculum villa with gardens laid out in terraces and shady groves, one of which he called the Academy and another the Lyceum. Near by Lucullus had one of his sumptuous estates, with formal walks, open pavilions, and outlook towers.

The Sabine Mountains on the western flank of the Apennines had many villas about Tibur (Tivoli), notably those of Maecenas, Augustus, and Hadrian. The seashore also had its country estates, not only Ostia and Laurentum, which were within easy reach of Rome, but

also remoter points like Antium and the beautiful region about the Bay of Naples. When the Italian Renaissance revived the ancient type of gardens, many estates like the Villa d'Este at Tivoli, the Villa Aldobrandini at Frascati, and the Villa Barberini at Rome occupied the sites of the once famous gardens of Hadrian, Lucullus, and Nero.



FIG. 13—Woman in a garden: mosaic in the Baths of Pompeianus. (After Charles Tissot: *Géographie comparée de la Province Romaine d'Afrique*, Paris, 1884, Vol. 1, Pl. 3.)

Moreover, they utilized ancient statues and vases which came to light when the soil was dug up for the new plantations.

The detailed description left by the Younger Pliny of his suburban villa at Laurentum and his country estate in Tuscany reveal the leading features of ancient Roman pleasure gardens. Like the Egyptian and Greek gardens, these were formal in design and were connected with the dwelling, so that life indoors and out was not divorced. The typical villa had a long portico opening upon a terrace. This was the *xystus* of the garden and served as an open-air drawing-room. Its level surface was covered with turf, broken here and there by beds of violets, crocuses, lilies, or other low flowers, each kind by itself in a separate plot. Its outer edge was bordered by box or other shrubs, trimmed often in fantastic shapes as in Pliny's Tuscan garden, or by a low marble balustrade recessed at intervals to hold a tall marble vase or fountain basin, as depicted in the wall paintings in the Palace of Livia at Prima Porta and the garden frescoes of Pompeii.

The *xystus* overlooked a lower garden, or *ambulatio*, with which it was connected by broad steps or a grassy ramp. Seen from above, the *ambulatio* presented the appearance of a varied mass of foliage grateful to the eye. But the shining green of the pomegranate trees

was pricked by the nasturtium red of its fruit. The pure yellow of the citron and the pale buff of the quince stood out against the dense green behind; for these fruits served the same decorative purpose as the lemon and orange later in the Renaissance gardens of Italy and

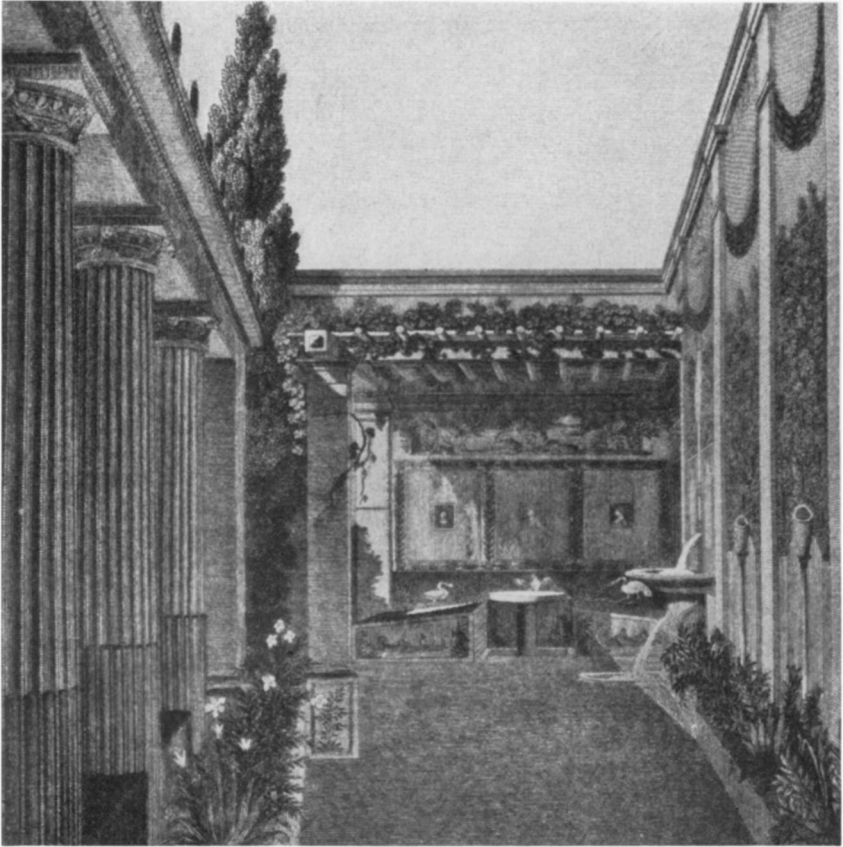


FIG. 14—Garden of the House of Sallust, Pompeii. (After François Mazois: *Les ruines de Pompéi*, Paris, 1824, Pt. 2, Pl. 38.)

the Moorish gardens of Spain. They contrasted with the solid masses of the flowering laurel and the pink or white oleander bushes, and their rounded tops of green with the slender spires of the cypresses.

This *ambulatio*, or second part of the typical Roman garden, was planned for leisurely strolls after a meal when mild exercise was joined to conversation. It consisted, therefore, of shaded walks and alleys for use when the sun was hot and of open paths for twilight hours. The spaces between the walks were planted with fruit or shade trees; but where a vista opened to sea or mountains the eye ranged across low beds of hyacinths, asters, jasmine, and roses.

The third section of the Roman garden was the *gestatio*, the shaded avenue where the master took his airing on horseback or in a litter carried by slaves. It either encircled the *ambulatio* or was laid out quite apart, usually in oval form. In either case it was bordered by a fancifully cut box hedge or by dwarf plane trees; for the Romans had discovered the art of dwarfing trees by peculiar methods of plant-



FIG. 15—Patio of the Linderaja, the Alhambra.

ing and topping them. The topiary art of clipping trees and shrubs was introduced into Rome from Syria about the beginning of the Christian era.

Gardens were not the monopoly of the rich and noble in ancient Italy. The remains of Pompeii show them attached to the average town residence scaled down to the size of a town lot. The old Italic *atrium* house of Pompeii had a small garden in the rear, enclosed by extended side walls of the dwelling and a cross wall at the back. It was therefore as wide as the house but usually quite shallow. The House of Sallust, built in this old style in the second century before Christ, had such a garden, 60 feet long and only 20 feet wide. Though small, it had all the elements of the traditional garden.

Pompeii lay in a region of ancient Greek colonies and had a considerable Greek element in its population, as indicated by numerous family names. Hence the Greco-Roman peristyle type was established here in the second century before Christ and prevailed in the handsomer dwellings. The peristyle court was adorned with flower beds.

vases of growing plants, fountains, water basins, and statues. All were arranged with studied symmetry, as the traveler sees them today in the great peristyle (33 by 65 feet) of the House of the Vettii, which has been restored and replanted according to the original plan.

Behind the peristyle and its apartments usually lay the garden or *viridarium*. The portico façade thrust out wings at either end and enclosed the garden on three sides by colonnades. A Pompeian wall painting depicts this type of semi-inclosed garden, evidently borrowed from Greece as it resembles the Cyzicene house garden described by Vitruvius.

As population increased in Rome and the private houses of the old city were superseded by tall apartment houses (*insulae*), the little gardens were crowded out; but in their stead window boxes of growing plants were introduced "to pasture the eyes on," Pliny says. Roof gardens crowned the city buildings with shrubs, grape arbors, fruit and shade trees, all planted in boxes of earth, while high above the street marble-rimmed fish pools reflected the blue sky or the silent stars.

The Roman type of garden may have been transplanted to Carthage on the conquest of Africa in 146 B. C.; or the conquerors may have occupied unaltered the fine villas that surrounded the Punic capital with their gardens and orchards from early times. In 310 B. C., when Agathocles of Sicily marched on Carthage, he passed through a cultivated and irrigated region, Diodorus tells us, occupied by the landed estates of the Carthaginian nobles, "which they improved for their delight and pleasure." Centuries later villa parks of surpassing beauty still persisted. Aesthetic gardening was a natural development for a people who inherited the principles of Phoenician horticulture, who produced an authority on tillage like Mago, and who, like the Romans, had a rich and privileged class.

GARDENS IN SPAIN

Ancient Spain has left no record of pleasure gardens, though, under the favorable conditions of climate and relief, they may have readily developed from the intensive tillage of the native Tartessians and the colonial Phoenicians, Greeks, and Romans who settled on those shores. Strabo (b. 63 B. C.), sailing up the Guadalquivir, described with enthusiasm the beauty of the "orchards and gardens which in this region are met with in highest perfection"; but he failed to specify pleasure gardens. Here at Gades (Cadiz) was born Columella of Roman blood, who more than any other writer on ancient horticulture sang the praises of flowers, as he had seen them grow in his father's gardens beside the Guadalquivir.

With the Saracen conquest in 711 A. D. Spain begins to glow with the beauty of its gardens. The Arab conquerors, conservators of

ancient Mediterranean civilization in an age of barbarian invasions, had already mastered the art of gardening in their eastern homes; they embodied the ideal of their craft in the Moslem dream of paradise. But the environment of Spain produced the perfect efflorescence of this art, because it gave to the craftsman incentive, opportunity, abundant material, and abundant reward. The gardens of Spain became a revelation of the Saracen spirit finer even than the dream of paradise. Here race and environment seem to have combined to produce perfection; but it must not be forgotten that the previous habitat of this conquering race lay among the orchards of apricot and almond, among vineyards and balsam groves, and beside pools and rivulets of Yemen and Mecca. Who tilled those narrow terraces, who watered those slender garden plots earned beauty as well as life.

Many of the old gardens of Granada have survived Christian depredations. The fact that impresses one here is the succession of small gardens incorporated in the architectural mass of the Alhambra and the Generalife—the group of jewel spaces, each in a setting of stone walls or stucco arcade, each exquisite and distinct in itself. Such is the little Patio of Lindaraja with its alabaster fountain, its thicket of roses and myrtle and citron and orange, tempering the noonday glare to a mysterious gloom. Such is the *Jardin los Adarves* with its vine-covered trellises and its blossoming trees looking toward the snowy Sierra Nevada. The Generalife too reveals the charm of small and perfect gardens. Here they glow with sunlit flowers; there they are subdued to deep shade in a sunken water garden, whose green pool is overhung by lines of aged cypresses. This composite grouping recalls the complex garden enclosures of Egyptian Thebes, of Rome, Tibur, Tusculum, and the Naples country; and it makes one realize that the Egyptian Pharaohs, the Roman Caesars, and the Moorish Sultans all planned their gardens after one common model.

The arcade about the Generalife "Garden of the Pond" bears the inscription: "Charming place! thy garden is adorned with flowers which rest on their stalks and exhale sweetest perfumes; fresh breezes stir the orange tree and spread abroad the fragrance of its blossoms. I hear voluptuous music mingled with the rustling of leaves in thy grove. Everything about is harmonious, green, flowering."

"Awake, O north wind; and come, thou south; blow upon my garden that the spices thereof may flow out." East meets West, the garden of Palestine and the garden of Granada.



Irrigation and Reclamation in the Ancient Mediterranean Region

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IRRIGATION AND RECLAMATION IN THE ANCIENT MEDITERRANEAN REGION*

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INTRODUCTION

The early date at which irrigation appeared in the Mediterranean lands is proof of its necessity. In Egypt it goes back to 4,000 B.C., or beyond, and in other sections of the region it is described, often minutely, in the most ancient literatures or the earliest records of ancient travelers and traders. It developed in response to condition of climate and relief, and therefore from of old it was as widespread as it is today in these same lands. It supplemented the winter rains in dry years when the tantalizing clouds held tight their burden of moisture; it saved the ripening fields of wheat and barley when late spring showers quite failed; it rendered possible all the quick-growing summer crops which required intense heat and ample moisture; and it was regularly applied with animal manures, in order to make these beneficial and not deleterious to the crops.

Furthermore, irrigation was bound up with reclamation projects designed to increase the arable area of the Mediterranean countries. It pushed forward the verdant line of vegetation into the tawny arid margin of the Mediterranean region; it was closely connected with the reclamation of wet lowlands by means of dykes and canals, for drainage ditches at proper levels were readily converted into irrigation conduits; and it became an adjunct to dams or reservoirs for flood control of mountain torrents, when these flashed into spate during winter storms and scoured the bordering fields.

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The author uses modern climatic data because the burden of evidence indicates no appreciable change in climate in historical times.

Fertile, moist alluvium, always at a premium in this region of predominant mountain relief, was found only in valley floors, small lacustrine basins, and silted coastal plains. Here the soil was best and ground water abundant, but such lands were exposed to inundation during the winter rains and spring thaws on the highlands. Where they took the form of extensive deltaic flats on low coasts, the sluggish run-off left them water-logged, fit only in their natural state for wet summer pastures. To reclaim this productive soil, the ancient farmers early adopted measures of flood control. Their first step was to build dykes for the protection of the tilled fields; the next was to divert the excess water to nearby districts needing more moisture; and the final step was to impound the flood waters of the winter for summer distribution.

Irrigation in the Mediterranean countries had therefore either the single motive of conducting water to arid lands, like the streams of Anti-Lebanon to the flowery oasis of Damascus, or the double motive of drainage and distribution. Wherever practised, it stimulated intensive tillage. Irrigable land was generally limited in extent and high in value. As an economic proposition, it had to make a return commensurate with the outlay of capital and labor expressed by the water tax.

Crops Raised by Irrigation.—The crops requiring irrigation were numerous. They included various legumes, like bean, pea, lentil, vetch, and chicken-pea, which were sown in the spring and watered when in bloom but rarely afterwards;¹ hay meadows, watered after each mowing, which usually occurred three times during the summer;² fodder crops, especially alfalfa or medic clover, which was harvested from four to six times annually and as often irrigated;³ panic and millet, raised as summer crops on irrigated land, which in dry regions like lowland Cilicia and Greece was covered with a network of conduits.⁴ But panic was given water in moderation, because an excess made it lose its leaves.⁵

One notes that the ancient farmers practised irrigation with caution and with economy of water, to get the best results. According to Virgil, in the Po valley water was shut off from a young meadow as soon as the grass had put forth a stem, though irrigation streams were abundant.⁶ All plants accustomed to a dry soil and climate received an absolute minimum of water in summer, both in Greece and Italy. Fruit trees and deciduous shade trees, when being propagated in nursery beds, were frequently irrigated; but when mature, they were irrigated only in the intense drought

of late July and August, and then only sparingly because much water was found to injure the roots. Moreover, the amount was proportioned to the age of the trees, saplings with their scant foliage receiving less.⁷ This caution in application of water may partly explain the rare mention by ancient writers of saline or alkaline accumulations on irrigated soils, though high relief and rapid drainage also contributed to this healthy condition.

The ancient Jews and Greeks regarded summer tillage and irrigation as inseparable. Homer describes the irrigation of plantations, orchards, and gardens in Ithaca and Sheria (Corfu), both islands on the rainy western side of Greece.⁸ Theophrastus states that vines and pomegranates loved water and derived thence their chief nutriment;⁹ but the irrigation of vineyards was generally confined to dry districts like the eastern, rain-shadow slope of the Taygetos Mountains in Laconia,¹⁰ and the arid, over-drained soil of Palestine. Ezekiel, in his rich figurative speech, describes a vine "planted in good soil by great waters, that it might bring forth branches and that it might bear fruit."¹¹ Pliny mentions the irrigation of vines in the high Sulmo valley of the Central Apennines, as a method of improving the harsh flavor of the local wines;¹² but water was so abundant in the Sulmo district that grain fields also were irrigated in spring.¹³

Even olive groves were not everywhere exempt from irrigation. They yielded the best oil when cultivated by dry-farming methods; but if large fruit was the object, they were watered in mid-September to stimulate the growth of the berries.¹⁴ But the poor limestone soil and dry climate of Attica necessitated pungent manure and moderate watering for the olive orchards.¹⁵ The sacred grove of Pallas Athene in the Academy, which was irrigated by the parceled streams of the Cephisos River, served as a public park; its "deep impenetrable shade" lauded by Sophocles¹⁶ indicates a dense foliage due to ample watering, for olive trees usually afford scant protection from the searching rays of the Mediterranean sun, as any one familiar with Greece well knows. It was in regions with little surplus water for irrigation, like Syria, Palestine, Cyrenaica, Attica, Sicyon, and Corinth that oil rather than fruit formed the chief product of the olive orchards.¹⁷

Fruit trees and shrubs from the monsoon countries of Asia and the river oases of Persia and Mesopotamia were gradually introduced along the maritime track from the Orient, as articles of commerce or prizes of the Macedonian and Roman conquests of

the Near East. Such were the apricot, peach, various plums, cherries, pomegranates, and finally the citron. These trees, which required both heat and moisture for fruition, gave fresh impulse to orchard culture by irrigation. Hence they were planted near the base of the mountains,¹⁸ where springs broke out along old fault lines and kept the soil damp through infiltration or supplied water for irrigation. Such conditions were found along the edges of the Eurotas valley in Laconia, where the traveler today sees orange groves. Associated with these plantations were doubtless the orchards of pears and apples native to the region, but requiring mid-summer irrigation to develop the fruit.¹⁹ Varieties of both were numerous, but the only good ones came from the cooler districts of the region. The best were raised in an Alpine village near Aquileia and exported to Rome; the next best grew near Gangra far up in the highlands of Paphlagonia.²⁰

The Mediterranean region produced in spring bulbous or tuberous plants and countless herbs. Found in their native state, they were small and undeveloped, but when their growing period was prolonged into summer by artificial irrigation, they afforded an excellent and varied vegetable diet. Therefore, the well watered vegetable garden became a feature of ancient Mediterranean tillage. It was worked with the utmost care, manured and irrigated;³¹ bulbs and seedlings were regularly transplanted to stimulate the growth.²² Interculture of garlic or onion with some companion crop of legumes was practised.²³ Hardly a feature of modern intensive cultivation was omitted. The great cities of the ancient world, like Jerusalem, Thebes, Athens,²⁴ Alexandria, Carthage, and Rome²⁵ were surrounded by these truck gardens, which sent their fine produce daily to the urban market throughout the summer, and that with excellent profit. Columella describes the gardener returned from the city, his pockets jingling with coin and his head soaked with wine from repeated celebrations of a prosperous day.²⁶ Certain small plots of land planted with artichokes, in the vicinity of Carthage and of Corduba in Spain, yielded a yearly income of \$124.00,²⁷ thus rivalling the famous artichoke fields in the Carmel River floodplain of California. Megara so depended upon her export of onions and cucumbers to Athens, fifteen miles away across the Gulf of Salamis, that her market gardeners faced bankruptcy when in 444 B.C. Athens prohibited the trade. Rich Athenian epicures got their earliest vegetables from the nearby islands, where the warm spring stimulated growth.²⁸

In addition to these various summer crops, irrigation was required by nearly all agriculture on the southern and eastern margins of the Mediterranean region, where the desiccating trade winds held sway. The Nile valley was a long-drawn fluvial oasis; other wadi oases fringed the African front. The rivers of Damascus and the slender streams of Moab stretched long green fingers into the tawny desert of Syria. Farther east similar conditions of long summer droughts and scant winter rains prevailed in the plain and piedmont of the Tigris-Euphrates valley, where again irrigation became the basis of agriculture. Its principles, there perfected, may have penetrated from the Mesopotamian hinterland westward by way of Syria, Phoenicia, and Palestine; or they may have spread from Egypt around the circle of the Mediterranean coasts. They found vehicles of dissemination at hand in commerce, colonization, conquests and especially the slave trade which distributed skilled cultivators all around the ancient Mediterranean shores from this eastern hinterland.

The Antiquity of Irrigation.—However, irrigation may have been a native discovery made independently in several parts of the Mediterranean Basin in response to climatic conditions. This was possible wherever the uncertain rainfall brought a lean harvest in dry years. While geographic conditions set the problem of supplementing the inadequate precipitation, they also gave the cue to the solution. Everywhere the recurrent floods of swollen winter streams suggested the method of distributing the fructifying waters to the thirsty fields. Nature presented the object lesson, and repeated it year after year with pedagogical fidelity. The theory of independent discovery receives support from the development of irrigation elsewhere in widely separated regions like China, the Melanesian islands, Mexico, and Peru. In all these imitation seems excluded. On the other hand, irrigation stretched across Eurasia in an almost unbroken belt from Spain to India and Java in very early times; here imitation is not excluded.

Legendary history names some of the distributors in the Mediterranean lands. Danae and his fifty daughters, leaving the old matriarchal community of Egypt, established their clan in Grecian Argos and there introduced tillage by irrigation. Phoenicia, which was dominated alternately by Babylonian and Egyptian influences, and early acquired the principles of irrigation, sent out countless colonists whose trail was marked by water conduits and pools, from

Asia Minor to Spain. Cadmus, the Phoenician, in the very act of founding Boeotian Thebes, introduced irrigation; and his descendants doubtless carried this along with the other useful arts which they communicated to Attica.²⁹ The Greek Heracles, borrowed from the Phoenicians, was the practical benefactor of mankind, teaching the control of water for irrigation. The Etruscans of semi-Asiatic stock apparently taught in Latium principles of irrigation which their colonial ancestors had learned on the Asia Minor coast from Tyrian and Sidonian settlers; and irrigation again followed in Spain and Africa on the arrival there of Phoenician colonists.

Source of the Water.—While the seasonal distribution of the rainfall made irrigation desirable, the prevailing mountain relief of the Mediterranean lands made it possible. High folded ranges rising to 5000 or 7000 feet and peaks towering to 9000 feet or more retained their snow until midsummer. The Sierra Nevada of Spain, Mt. Aetna, Mt. Olympus of Thessaly, the peaks of Lebanon and Mt. Argæus in the eastern Taurus system showed white patches in shady gorges till late August. The northern ranges, like the Alps, Pyrenees and Rhodope massif, had yet deeper snows owing to heavier precipitation, and kept them longer owing to cooler summers and reduced evaporation.³⁰ All the highlands were therefore reservoirs of moisture, whose supply in former days was conserved by the forest covering and renewed by the occasional summer showers. These highlands fed their melting snows and their rain into the drainage streams, and thence into the farmer's irrigation ditches, which thus ran full during the growing season of the summer crops, even if they dwindled at harvest time.

Irrigation water was supplied also by the copious springs which issued from the lower slopes of chalk and limestone ridges, especially where the limestone rested on sandstone or crystalline rock. Subterranean reservoirs of the widespread Karst provided a steady flow of water, and therefore were a safer and surer source than the variable mountain stream, which often threatened inundation to the plotted garden or tilled field. The same advantage belonged to the wells sunk to ground-water in valley, lacustrine basin, or coastal plain. These, however, entailed the labor of lifting the water to the surface by well-sweep or wheel pump worked by oxen or asses, as the traveler sees them today in the Tell valleys of the Atlas amid the low-growing vineyards, or in the orchards about Gaza and Ascalon in the Tertiary coastal plain.

of Palestine. A rainfall of 16 to 35 inches (400 to 900 mm.) in the Tell valleys and of 8 to 16 inches (200 to 400 mm.) in southern Philistia, reinforced by drainage and infiltration from the nearby slope, supplied enough moisture for winter crops, but during the summer drought irrigation from the numerous wells was imperative then as now.³¹ The ancients preferred spring and well water for irrigation because it was cool and fresh, and also because it brought no weed seed to the fields, as did the irrigation ditches fed by drainage streams. On the other hand, wells sunk too near the coast were likely to contain brackish water, which was bad for the purpose.³²

Necessity for Irrigation.—Fluctuating seasonal rainfall and limited arable area together put the screw upon the ancient Mediterranean farmer, and forced him to his obvious national task of extending his tillage land into desert, swamp and mountain slope. Under state or community direction, he undertook costly reclamation enterprises into which irrigation entered. On the arid margin, east and south of the Mediterranean region, he pushed forward "the line between the desert and the sown," wherever the fructifying waters were available. The soil brought under tillage was rich in phosphorus and potash, which are leached out in rainy lands; the irrigating streams contributed a top dressing of silt to the land and other plant food in the form of mineral salts held in solution. The result was big crops and reliable crops up to the regular limit of the water supply. This was the encouragement to extension of irrigation in ancient Egypt, Syria, Palestine, Carthaginian Africa, and Spain. This explains the flowering orchards and gardens spread out fan-wise in the fluvial oasis of Damascus, which seemed to the weary eyes of Mohammed a Paradise on earth.

I. IRRIGATION OF TERRACED LANDS

Terrace Agriculture.—Irrigation was often associated with the reclamation of mountain slopes by terracing, which contributed to water conservation. The districts commanding a reliable summer water supply were necessarily limited owing to both climate and relief, except in the Nile valley and along the northern rim of the Mediterranean climatic region. They were found elsewhere sparsely scattered over the mountain sides where springs appeared, as on "the slopes of many-fountained Ida," or closely distributed at the base of the ranges, where streams and piedmont springs issued upon the valley floors. Both situations suggested terraces

and contour ditches in order to expand the arable area accessible to the irrigation streams, to conserve the water supply (whether natural or artificial) by checking the run-off, and finally to prevent surface erosion. Hence terrace agriculture was constantly associated with ancient irrigation, especially in those Mediterranean lands which were formerly more populous than now.³³ It meets us in ancient Phoenicia, where the whole country was atilt and where irrigation had been reduced to an art; in Palestine, where "shoulder-stones" of old retaining walls are scattered over the mountains of Carmel, Gilboa and Samaria, once famous for their fertility.³⁴ Ruins of ancient terraces, designed for barley fields or olive orchards, are found lining the steep valley slopes of Moab and the arid Negeb in southern Judea,³⁵ where occupancy depended upon the control of springs.³⁶

Terrace agriculture early appeared in Greece, probably to utilize the slopes of its fortress heights. This may be the significance of Homer's "terraced Ithome," a mountain stronghold of Thessaly. The steep hill whence Mycenae ruled the Argive plain is scarred by concentric lines of old retaining walls, which suggest to the modern observer terraced vineyards and gardens to supply the table of Agamemnon. Slopes were thus cultivated in Greece more extensively in ancient times than now, for age-long destruction of the forests has impaired the conservation of the water supply and reduced the arable land to 12.5 per cent of the total area.³⁷ Terracing was doubtless as common in the Aegean Isles as today, when the traveler marvels at the tiers of cultivation rising from the sea shore to mountain crest on Tenos, Cos, Thera and other islands. Their bold relief and small area combine to restrict level land to a minimum. Only Naxos among the Cyclades possesses a lowland. Thera (Santorin), which is the breached rim of an old volcanic crater and measures only three miles in width, culminates in a height of 1860 feet. Melos, another half submerged volcano, has an area of 57 square miles and a summit elevation of 2505 feet. Similar ratios of altitude and area hold in nearly all the Cyclades and Sporades, which are handicapped also by a meager rainfall of 20 inches (500 mm.) or less, (Thera 14 inches, 362 mm.). Terracing alone could extend the crop land and conserve the water supply. Their population, dense in very early times, implied a local food supply; for their mineral wealth was small apart from their marble. Homer speaks of "well-peopled Cos" and "well-peopled Lemnos."³⁸ Extensive colonization movements from many Aegean Isles as early as the sev

enth century B.C. point to congested population; and the fame of their wines points to terraced vineyards like those covering the slopes of Cos and Thera today.

Roman Italy, with its ampler endowment of plains, might have postponed the hour of terracing; but the fertile soils of volcanic peaks like Aetna and Vesuvius, and the wide distribution of rich volcanic ash and tufa in the Apennines made these mountains early seats of sedentary population, which enjoyed there also better climate and surer water supply than the plains could offer. Hence ancient Italian tillage was associated with terracing and irrigation wherever hill slopes were accessible to distributing canals, or where populous hill towns like those of Etruria, Latium, and Umbria, built in a warring age, exploited all the tillage land within the protecting reach of their citadels.

II. RELATION OF IRRIGATION TO RECLAMATION OF WET LANDS

Irrigation and Reclamation of Valleys.—More important from an economic and social standpoint was the irrigation which attended the reclamation of river flood plains, coastal marsh lands and swampy lake basins; because their abundant humus and composite soils repaid year-round cultivation. Upstream reservoirs and dyked channels made it possible to restrain the swollen winter torrents within their banks, and thus transform flooded wastes into ploughland; but they also provided for the summer irrigation of the low-lying fields. This dual process has been inaugurated from grey antiquity to the present. A recent contract (1928) let to an American construction company by the Grecian government provides for the reclamation and irrigation of the lower Vardar (Axius) valley in Macedonia. Its methods will duplicate in their basic features similar enterprises of nameless ancient engineers, whose accumulated works running through undated centuries were attributed to certain great national heroes.

Irrigation in Egypt

On the Flood Plain.—The network of canals in the Nile flood-plain drained or irrigated according to the way the water was controlled. The system of basin irrigation developed by the Pharaohs from the time of Menes (5000 B.C.) was the most efficacious one possible for the Egyptian climate and Nilotic conditions. Only the left bank of the Nile was first reclaimed. A longitudinal dyke was run parallel to the stream on the left bank, and tied by numerous cross dykes to the Libyan hill range on the

west. Into these basins the "red water" of the Nile flood was conducted by natural or artificial channels and allowed to deposit its mud, while it thoroughly saturated the soil. Meantime, the whole right bank and trough of the river furnished passage for the floods to the sea. Reclamation of the right bank did not begin till the Twelfth Dynasty (1380 B.C.); it was a far more difficult project, involving the problem of disposal of excess water by escape-drains through the Delta, so that the water should not be held in the basins longer than forty-five days. Retention of the water for this period secured an adequate top-dressing of red mud and also saturated the subsoil, where this possessed the proper consistency; thus it provided plentiful ground-water which was used in winter and spring for irrigating later crops. It is a significant fact that all the ancient capitals of Egypt occupied sites with extensive subsoil water reserves, which permitted all-year irrigation. Abydos, where the philosopher king Aknaton laid out his pleasure gardens, has the best subsoil water in the Nile valley; Thebes and Memphis have an excellent supply.³⁹

In the Delta.—The so-called "plagues of Egypt" were natural incidents of Nile control as practised in the lower Delta or "field of Zoan." In the old days of basin irrigation, and that too from earliest times, according to Sir William Willcocks, it was the Egyptian custom to build temporary earthen dams across the inferior Nile distributaries about twenty miles above their "tails," in order to hold back the flood water and let it overflow the maximum area of land. This was done at the peak of the flood about August first, when the fertilizing "red water" arrived; it was a method invariably adopted in years of "low Nile" to husband the water and extend the irrigated area to the utmost. The exclusion of the fresh water from the tails and the rapid evaporation in August combined to admit the salt water from the Mediterranean, with the result that the river fish died and the frogs beat a hasty retreat to the land. The Israelite settlers living in Goshen near the tails of the east Delta channels saw every year at the time of "red water" myriads of fish floating dead and attributed the phenomenon to "the water turned into blood."

The Pelusiatic arm of the Nile, thus dammed below Bubastis during a low Nile to check the out-flow, flooded the Wadi Tumilat, irrigated the grain fields and pastures of Goshen, renewed its sweet subsoil water, and brought plenty to the immigrant Hebrew tribes thereabouts. But it condemned the district of Zoan or

Tanis on the lower Pelusiac Nile to plagues of dead fish, frogs, sand-fleas, flies, polluted wells, with the consequent infection and death of cattle and babies. No miracles these: only the operation of natural laws set in motion by a certain human enterprise under certain geographic conditions. The first and second plagues were ordinary occurrences, produced "also by the Egyptian necromancers," according to biblical statement. The other six came only in a very low Nile, which might occur once in a century or two. "Darkness" was probably due to a protracted northwest wind, bringing clouds of dust to obscure the sun; and the swarms of locusts doubtless came from the deserts of Arabia as they do today. Hail, which is not unknown in the Nile Delta, probably came in late January, since it destroyed the barley crop, then nearly ripe, but did not injure the still immature wheat. The low Nile played no part in these last three plagues, which were fortuitous.⁴⁰

Irrigation in Greece

The embanking of rivers for flood control was a common practice among the Homeric Greeks.⁴¹ They knew "the winter torrent at the full that in swift course scatters the dykes; neither can the long line of mounds hold it in, nor the walls of the fruitful orchards stay its sudden coming, when the rain of heaven driveth it."⁴² Yet earlier, in the legendary period, various heroes instituted combined drainage and irrigation works, so far back into the past did these undertakings reach. The characteristic labors of Heracles show him grappling with some problem of water control, whether in Thrace, Argolis, Elis or in Acarnania, where he reclaimed for tillage the flood plain at the mouth of the silt-bearing Achelous. This river, described in legend as a roaring bull when in flood and as a writhing serpent when shrunk to a meandering brook in the summer drought,⁴³ he embanked and diverted its surplus water by an artificial channel to irrigate the bordering tract of alluvium. The reclaimed tillage land and the crescent course of the new channel which irrigated it, the hero presented to the neighboring King "as the horn of plenty" which all summer produced abundant fruit like apples, grapes, and pomegranates.⁴⁴

Irrigation in Thessalia.—In like manner the Thessalians of Larisa, who occupied the richest portion of the lacustrine basin drained by the Peneus River, embanked this stream to protect their fields from the floods which often washed away the soil into the

overflow basin of Lake Nessonis.⁴⁵ But the moderate annual rainfall of this district (20 inches, 502.4 mm.),⁴⁶ and the low summer minimum, which makes the Larisian plain in June as dry and dusty as Egypt,⁴⁷ offered inducements for irrigation, while the dyked stream, fed by the lingering snows on high Olympus and the Pindos Mts., furnished a ready irrigation system. The abundant and varied food which weighed down the tables of the voracious Thessalians was partly supplied from irrigated gardens and orchards surrounding the capital city. Apparently, too, the low flooded basin of Nessonis, alternately swamp and lake,⁴⁸ was frequently reclaimed. Homer fails to mention Lake Nessonis, because, as Strabo surmises, the district was uninhabited owing to inundations; but Simonides of Ceos (556-469 B.C.) speaks of its Pelasgi population.⁴⁹ In the fourth century, possibly during the efficient administration of the tyrant Jason (369 B.C.), the swamp of Nessonis was drained so completely, that "after the water was drawn off and the land was dry, the air became colder and frosts more frequent," to the destruction of the fine old olive groves and the occasional injury of the vineyards.⁵⁰

Reclamation produced similar results in the old Lake of Philippi, which occupied a valley basin in the Pangaeus Mts. of southwest Thrace. When the native Thracians occupied the district, so tradition ran, the whole plain was a big forested swamp, a gathering place of the waters from the surrounding mountains,—"*multas aquarum collectiones et stationes habit.*" "But after the basin was drained and for the most part dried out and the whole country brought under cultivation," the district became more subject to frosts.⁵¹ This reclamation was probably instituted by Philip of Macedon after his conquest of the territory in 356 B.C., to furnish local supplies for his new town of Philippi, which was designed as market center for the rich gold mines in Mt. Pangaeus. Hence the enterprise was recent history to Theophrastus writing about it in 313 B.C. It was almost inevitably associated with irrigation, for this coastal belt suffered from scarcity of summer rains and failing streams.⁵² Cvijic states that the practice was very ancient and widespread, tracing back to an oriental or Byzantine origin; that irrigation canals, constructed on the ancient plan, were mentioned in the charters of the Serbian kings of the thirteenth century. They are numerous today in the basin of the Meglen River, which formed the heart of Philip's Macedonia, and which now regularly yields two crops annually under irrigation.⁵³

Irrigation in Southern Greece.—Farther south, in the narrow peninsular area of Hellas and Peloponnesos, where the valley plains contract, the arable land shrinks, rainfall declines, and summer drought lengthens, reclamation and irrigation became increasingly urgent. The Eurotas River of Laconia was ascribed to a large canal constructed by Eurotas, a mythical king of Sparta, to drain the Spartan plain.⁵⁴ The legend probably epitomized centuries of piece-meal reclamation; for this middle section of the Eurotas valley, blocked on the south by the Bardunochoria hill belt which cuts it off from the sea, was formerly a Pliocene inland lake, which was slowly drained as the Eurotas eroded its gorge through the limestone barrier to the Mediterranean.⁵⁵ The process was incomplete even in historical times. The ancient city park Plantanistas or Planetree Grove occupied an artificial island surrounded by channels of the braided stream⁵⁶—evidence of water control,—while Limnae, an urban district of Sparta in a depression by the Eurotas, had its name from the former marshes there. Its temple of Dionysos occupied a wet site, which in the course of time was drained.⁵⁷

In the Karst Country.—The karst country of Greece utilized for irrigation its great “fountain-heads” or kephalari, surface vents of underground rivers; these were often so copious and had so many “heads” or mouths that they formed considerable streams and necessitated reclamation enterprises to control and distribute the water. The River Erasinos, which issues near Argos from its twenty-mile subterranean course from Lake Stymphalus, has force today to drive a dozen mills, and in ancient times served to water the adjacent Argive plain.⁵⁸ In a cavern above the spring sacrifices were offered to Dionysos and Pan, both gods of husbandry; and now in mid-August a Panegyris is annually celebrated here, for the summer drought is just as severe and the human need is just as great. Six miles south of Argos, on a narrow coastal strip at the base of Mt. Pontinos is the gushing spring of Amydone, which forms the Lerna River and swamp. Here Heracles, “man’s great benefactor,” fought the monster Hydra or water snake with its nine heads; and as soon as he severed one head two others sprang out in its place.⁵⁹ The spring gave evidence of strong hydraulic pressure. In ancient times it watered a sacred grove of plane-trees, where solemn rites were celebrated in honor of Demeter and Dionysos, gods of tillage.

In Boeotia.—Boeotia was the scene of various reclamation projects from the legendary period to recent times. Cadmus of Tyre, a typical Phoenician engineer and colonist, "was directed by the gods to fix his abode in the rich wheat lands where gushing Dirce's fair streams pour their water over green and fruitful fields." But a dragon had its lair in a limestone cave beneath the high Cadmean citadel; it ravaged the Theban plain and "watched with roving eye the watered vales and quickening rivulets."⁶⁰ This monster typified the mighty spring of Ares, which the hero snared in a network of canals and thus held captive. He converted its devastating streams into beneficent water conduits, and made the Theban district the most productive in Greece. An unknown writer about 250 B.C. thus describes the area: "All its parts are level, its form is circular, and its hue black like the earth. Everywhere well-watered, verdant, undulating, it includes more gardens than any other city in Greece. For two rivers flow through its precincts, watering all the level land adjoining their banks, and hidden springs descend from the Cadmeia in artificial channels, said to have been constructed by Cadmus in very ancient times."⁶¹ Today several large tanks of ancient masonry with inscribed tablets impound the water of the famous Dircean springs and distribute it to the surrounding gardens. They stand there, still performing their age-long service, mute intimations of the immortality of geographic forces in history.

Boeotia contained also several enclosed lake basins with underground outlets typical of the karst regions of Greece. They furnished admirable soil but were subject to inundation when the natural vents in the underlying limestone became choked up or proved inadequate to carry off the winter floods.⁶² Lake Copais, the largest of these basins, shrank to a reedy swamp in late summer, but when it attained its highest level in late winter, covered an area of ninety square miles.⁶³ Theophrastus, on the basis of old traditions, estimated that this occurred about once every nine years; though its duration was variable. At the time of the battle of Chaeronea (338 B.C.) and for several years before, Lake Copais was deep; it filled up again later at the time of a severe plague, but failed again in winter.⁶⁴ During sustained droughts, the lake dried up so completely that all the aquatic vegetation became sere.⁶⁵

The earliest inhabitants of this lacustrine plain, dating back to Minyan Orchomenos (2000 B.C.) or yet earlier to the Stone Age, kept Lake Copais at a low level and thus reclaimed for tillage a wide zone of fertile land by constructing canals and enlarging the

openings or katavothra to the underground channels.⁶⁶ These ran eastward under Mount Ptoon and debouched as great springs near Larymna on the Euboean Sound.⁶⁷ The traveler in Boeotia today sees the masonry of the ancient dykes, and caverns in the mountain shore which mark the tunnel course of the katavothra. Drainage works, executed by a British company about 1890, consist of a girdle canal which intercepts the affluent streams on two sides of the Copais basin, and discharges its water by a series of tunnels and minor katavothra lakes into the Euboean Sound.⁶⁸ Significantly enough, it is a belated copy of a girdle canal described by Plato as encircling the mountain-rimmed plain of the mythical Atlantis and connected with a network of conduits intersecting the plain.⁶⁹ Plato doubtless copied the reclamation system in operation in several lake basins of Greece.

Reclamation of Lake Basins, Boeotia.—These reclamation works about Lake Copais recovered many thousand acres of irrigable tillage land and founded the agricultural wealth of Gla, Orchomenos, Copae, Acraephium, Coreneia, Haliartos, and other places. All these cities occupied hill or mountain sites for safety from the recurrent inundations. Even so, the rising waters often trapped them. The legendary history of Boeotia abounds in tales of towns swallowed up by floods; it had its local variants of the deluge myth with quite distinctive features. The underground outlets of Lake Copais became obstructed with serious results in the time of Alexander the Great, when Crates of Chalcis, a mining engineer, undertook the work of clearing out the channels; but he left his task unfinished when an insurrection broke out in Boeotia. This was the period of high water alluded to by Theophrastus.

A different method of combined drainage and irrigation was devised by the inhabitants of ancient Thisbe, who occupied a small katavothra lake basin on the southern slope of Mount Helicon in western Boeotia.⁷⁰ They ran a dyke through the lake along the axis of its drainage; every second year they diverted the water to one side of the dyke, and tilled the land on the other, which was soaked with moisture and naturally fertilized by decayed vegetation.⁷¹

Of Lake Basins in Arcadia.—The rugged highlands of Arcadia abound in similar lake basins, which in ancient times furnished the best arable land but were subject to inundation. Efforts of ancient engineers to control the fluctuating water level and reclaim

the land for tillage were epitomized in the symbolic labors of Heracles. The hero, for instance, rescued the plain of Lake Stymphalos from a plague of foul birds, symbolizing the torrents which rushed down from the surrounding mountains and devastated the land.⁷² Lake Pheneos, whose surface has for ages oscillated with the seasonal rains and the open or obstructed conditions of the underground discharges, was in antiquity a fertile plain.⁷³ The stream feeding the lake was conducted across the plain to a katavothra by an embanked canal, five furlongs long and thirty feet deep, ascribed to Heracles. When everything was in order above and below ground, it reclaimed nine square miles of fertile land, and made Pheneos a prosperous cantonal state in this ancient Switzerland of Greece. But the district was never safe from floods. Lying 2470 feet above sea level, surrounded by mountains from 2000 to 4400 feet higher, and subject to sudden storms, the little state found it wise to locate its capital city six miles from the katavothra and well up on the rim of the basin; but even so it once suffered from inundation.⁷⁴

Farther south, a series of four small katavothra basins, occupying the graben of eastern Arcadia and lying about 2000 feet above the sea, were reclaimed for the sake of the rich brown loam which covered their floors. Gradual deposition of silt from the surrounding slopes tended to raise the level, clog the drainage canals and choke the underground outlets; but the work of reclamation went on. The lake plain which fed the lofty city of Orchomenos (3070 feet) in the days of its greatness had an area of only four square miles. In the time of Pausanias it had reverted to a mere. The adjacent plain of Caphyae had its stream canalled and conducted to a katavothra.⁷⁵ The larger basin of Mantinea was carefully drained by canals and katavothrae,⁷⁶ and formerly supported a considerable population on its fluctuating eight square miles of fertile land. But a hill range on the south separated the Mantinean district from the larger basin of Tegea, which lay 100 feet higher and after heavy winter rains overflowed through a narrow defile into the Mantinean mere.⁷⁷ The regulation of the water in this course occasioned continual strife between the two towns. Prior to the seventh century B.C. and even in the pre-Dorian age, Tegea was a powerful state. It evidently inaugurated reclamation works at a very early date, to exploit the fertile lacustrine soil which formed the heart of its territory.⁷⁸ The main katavothra, a low cave in the rock wall at the southwest corner of the marshy lake, can still be seen from the highroad

crossing the mountains to Sparta; and still it serves to drain the vineyards and wheatfields which support the modern town of Tripolis, successor of hoary Tegea as metropolis of the basin.

Reclamation Enterprises in Italy

Reclamation Methods in the Etruscan Era.—Reclamation enterprises in Italy go back into grey antiquity and generally appear under Etruscan initiative. Several lakes or swamps (*paludes*) in and about Rome figured in the early chronicles but disappeared later. Such were the Goat's Marsh, where Romulus was struck by lightning, the Curtian Lake mentioned as existing in 745 B.C., Lake Regillus near Tusculum where the Romans defeated the Latins in 496 B.C.⁷⁹ The marshy valley between the Palatine and Capitoline Hills of Rome was doubtless reclaimed and cultivated at an early period. The Cloaca Maxima, ascribed by tradition to the Tarquin kings, originally served this purpose and may be classed with drains found⁸⁰ in other Etruscan towns like Graviscae, port of Tarquinii, located on a marshy coast. Clusium, overlooking the swampy lake-strewn valley of the Clanis River, rests upon a labyrinth of underground passages which probably belonged to an elaborate drainage system similar to that at Praeneste.⁸⁰ The district below Velitrae, which lies in the southern slope of the Alban Mts., is honeycombed with a system of tunnels or *cuniculi* running down towards the Pontine marshes. They probably served, as has been suggested, to carry off excess water from the swollen torrents and reduce erosion in the bordering fields. Ancient dams of polygonal masonry are found in the Scarabellata gorge, which scars the steep seaward slope of Monte Gennaro (4160 feet), the highest peak of the Sabine Mountains;⁸¹ and they seem designed to check the run-off and conserve the water for irrigation. In all these districts, Etruscan influence once prevailed.

Another Etruscan method of reclaiming land consisted in drawing off water from volcanic lakes by cutting tunnels through the crater walls. All the crater lakes in the Alban Mountains were tapped in this way. The tunnel emissarium of Lake Albanus was 1300 yards long. It was constructed, according to tradition, in 397 B.C. during the siege of Veii, when the lake filled up and threatened to overflow; but it was possibly much older. Livy's garbled account ascribed the plan to Etruscan soothsayers, who urged the Romans to use the water for irrigation and "scatter it harmless over the fields."⁸² A longer emissarium tapped Lake

Nemi at some unknown date, reclaimed for gardens and vineyards the shallow north end of the basin, and opened below through the old crater wall of Lake Aricia, which lay eighty-five feet lower. Thence its water was conducted in a canal which drained the shallow basin of Aricia, and issued by a tunnel through the low crater rampart on the southwest into a river. The old town of Aricia, whose citadel lay on a hill, belonged to the early Latin League; and its fertile basin, where irrigation is still maintained, became famous for its leeks and cabbages.⁸³ This lake region was the heart of the old Latin territory. Pressure of population doubtless forced it to these reclamation projects under Etruscan direction. The amount of arable land recovered was small, but its quality was excellent and facilities for irrigation lay to hand.

The tunnel and *cuniculi* drainage of Latium and southern Etruria, like the dyking of the lower Arno by Etruscans or Greek Pisans, belongs to prehistoric times; but similar reclamation enterprises were carried on with no appreciable break by the Latins and later Romans. The old lacustrine basin of the Velinus River in the Sabine country was subject to progressive inundation caused by deposits of travertine which dammed the outflow. It invited reclamation because its meadows and wet pastures were famous for their fertility and were located only about fifty miles from Rome. Hence a succession of drainage canals were made, the first in 271 B.C. by Manius Curius Dentatus; but the rising of the river bed necessitated fresh cuttings in the old channels or the construction of new ones.⁸⁴ Efforts to drain Lake Fucinus, which occupies a shallow, mountain-locked basin in the central Apennines, were stimulated by the rich soil around its shelving shores. The width of this arable zone varied widely with the rising and falling of the water level, which were very irregular; for the lake was "vast as a sea and of great service to the Marsi and all the surrounding nations."⁸⁵ The drainage enterprise was a big one, therefore. It was attempted with partial success by the Emperor Claudius in 52 A.D.; renewed by Hadrian, but accomplished only in 1875 by Prince Torlonia, who constructed a double tunnel emisarium four miles through a range of the Apennines to the Liris.

Reclamation of the Pontine Marshes.—Attempts to reclaim the Pontine marshes of Latium and the Maremma of Etruria were also big undertakings and urgent ones, because they lay in the heart of the old Roman territory and fringed a much used coast. The Etruscan towns like Volci, Vetulonia, Rusellae, Cossa, Tar-

quinii, and Caere were situated on spurs of the upland a few miles from the sea, and only their ports lay on the marshy shore. Populonia which occupied a lofty promontory (938 feet), an old "tied" island, with a little harbor at its base, was the only ancient Etruscan town located on the sea.⁸⁶ The Pontine marshes, which were reputed to have been once dotted with flourishing villages,⁸⁷ reverted to a permanent swamp during the Republic, probably due to slow subsidence of the basin or buckling of the coast. Efforts to drain the marshes were made by Appius Claudius in 312 B.C. according to tradition, by Cornelius Cethegus in 182 B.C., by Julius Caesar, Augustus, Nerva, Trajan, and finally by Theodoric the Goth. All achieved only temporary results, because the problem was apparently a progressive one, which is still engaging the attention of the Italian government.⁸⁸ In the time of Strabo, the great drainage canal along the Via Appia from Terracina was used for canal boat transportation between Rome and the coast.⁸⁹ Reclamation was evidently stimulated after the Hannibalic War (204 B.C.) which was probably responsible for the introduction of malaria into Italy from Africa.

In the Po Valley.—The canalization of the Po, which was subject to heavy spring floods, was begun by the Etruscans who diverted the sluggish waters of the river into the coastal swamps, in order to facilitate communication between the seaport Adria and the Adriatic.⁹⁰ Aemilius Scaurus in 109 B.C. drained the plains south of the Po between Placentia and Parma by means of navigable canals, in connection with the construction of the Aemilian Way.⁹¹ This road traced the north base of the Apennines and ran through a succession of new colonies whose fertile territory, developed by drainage and irrigation, could profit by land and water communication, and stabilize Roman power in this frontier province.

These government enterprises accomplished on a big scale what the Etruscan and Roman peasants had been doing on their farms every year on a small scale. With the advent of the autumn rains Cato directs all farm hands to work with pick and shovel, clearing out the drainage ditches or making new ones to carry off the excess water.⁹² Vergil, recalling his boyhood impressions of his father's farm by the Mincio River in the Po lowland, describes the whole country-side as "afloat with brimming ditches during the winter rains." In such districts a gridiron of trenches was necessary. From the furrows of the ploughland, the water ran into transverse channels and thence into open ditches.⁹³ A heavy

rain involved emergency work to prevent the canals from getting choked with mud and debris. Hence this was a permissible task for feast days, when other agricultural labor was forbidden.⁹⁴

Riparian Laws in the Roman Empire.—The Roman law reflected the necessity of water control. It required neighbors to maintain the dykes and clean the trenches forming part of a common drainage system, in order to expedite run-off and prevent overflows.⁹⁵ Down-hill estates were made subject to higher lands for drainage, a servitude imposed by nature but compensated in part by the rich soil washed down from the upper fields. However, law (*actio aquae pluviae arcendae*) provided redress if a farmer dammed a swamp or lake to exclude the flood waters from his own land, and thereby forced them to seek new outlets to the detriment of a neighbor's land below; or if he diverted the rain water from its natural drainage course on his own farm, and overloaded the channel running down into his neighbor's farm.⁹⁶ But the owner of the upper estate was free to impound water flowing on to his own land, for purposes of irrigation or other use, and could thereby intercept it from the farm below.⁹⁷ The law authorized any man to embank a river flowing through his land, and also to construct dykes and ditches on a neighbor's estate, where these were essential to his plan for flood control.⁹⁸ Moreover such works were protected by law. If unjustly destroyed, they had to be restored by the offender; but if swept away by the violence of the river in spate, there was no redress.⁹⁹

III. IRRIGATION IN DRY LAND REGIONS

Aside from irrigation associated with reclamation enterprises, the Mediterranean region presented many phases of irrigation by which the ancient farmer merely endeavored to get available water onto the land. His object was to vary and amplify the yield of his farm by raising summer crops; or, in case of need, to supplement the scant winter rains of dry years or of dry localities, where recurrent droughts brought recurrent failure to the winter crops and jeopardized the fodder supply of the farm animals. The marked variability in the amount and duration of the winter rains in the Mediterranean climatic region, the growing density of population, the increasing wealth and culture in the big urban centers which made a demand for increasing table luxuries, all combined to stimulate irrigation. Hence this particular form of intensive agriculture became widely distributed in the Mediterranean lands

and some of its finest phases, like elaborate floriculture, trace back to extremely early times. A detailed survey of its distribution will make this clear.

Irrigation in the Dry Season in Egypt.—The control of the Nile floods was a preliminary to the regulation and distribution of its waters; for the problems attending these national tasks underlay all Egyptian government and science, animated much of its religion. The peasant turned from the harvests of his flooded fields in March to the irrigation of his spring fields by well and shaduf.

Irrigation in Northern Africa

In Cyrenaica and Westward.—Farther west, where the level expanse of the African coast domes up in Barca Plateau, this highland attains sufficient altitude (3300 ft. or 1000 mm. in the west) to collect an annual rainfall of 11 inches (276 mm.) with wide fluctuation between 5.5 and 24 inches,¹⁰⁰—enough for grain in average years by the help of the dews and dry-farming methods, as is the case today.¹⁰¹ The products were typical of a fertile soil in a semi-arid karst region. But one notes the presence of terrace springs and short streams wherever gardens, orchards, and vineyards flourished, as about Cyrene, Hesperides, Barca, and Darnae.¹⁰² Diodorus Siculus lauds the fertile soil, the vines, olive groves, trees, and herbs about Cyrene, and then adds, "It excels also in the convenience of its streams. The land to the south where the nitre comes out permits no tillage, being bereft of flowing water, and it presents the appearance of the sea."¹⁰³ The coast town of Darnae owed its existence to a little stream, fed by two full springs, which today serves to irrigate gardens in the delta. Ruins of aqueducts and reservoirs show that the Romans conserved the water resources of Cyrenaica to the utmost, despite the difficulty of making storage tanks in the porous limestone.¹⁰⁴ The prosperity of ancient Cyrene was based on silphium, a wild native plant of the steppes; and when that was exhausted, the state declined.

Yet farther west, where a high escarpment of the African plateau approaches close to the Mediterranean and suffices to condense the winter rains (16 inches or 391 mm.) a few wadis find their way to the shelving coast and maintain high ground water in the littoral. Here in the Cinyps valley, where "the soil is black and well watered with springs," grain fields flourished under the combined effect of rains and dew; and irrigation helped in years

when the precipitation declined to nine inches or less.¹⁰⁶ At the head of the Syrtis Minor, in the rain-shadow of the Atlas Mts. precipitation became negligible and tillage frankly depended on irrigation. There lay the port of Tacape (rainfall 7 in., 183 mm.) occupying a small district of only nine square miles but great fertility, located in the midst of the sands. Through it flowed an un-failing spring, abundant to be sure, but only at certain hours were its waters distributed among the inhabitants; for its irrigation ditches fructified orchards of olive, figs, and pomegranates, with fields of wheat, pulses, and garden herbs growing beneath their grateful shade among the murmuring rivulets. No wonder the ground was costly.¹⁰⁶

In Atlas Mountain Region.—Only the high mass of the Atlas system, accessible to the rain-bearing winds from the west, ensured abundant water for irrigation. The Tell valleys, near the coast, get enough rain for winter tillage; but all the inland valleys were in ancient times, as today, dependent upon irrigation. When Agathocles of Sicily invaded Carthage in 310 B.C., he found the land beautified with gardens and fruit trees; sluices and canals were cut all along to convey the water by which the whole tract was abundantly irrigated. There were orchards of pomegranates, figs, olives, pears, and cherries, besides extensive vineyards, nearly all of which presupposed irrigation in this tradewind district. The fact that Carthage was importing grain in the third century B.C., according to Diodorus Siculus, points to the larger profit of horticulture by irrigation.

Eight centuries later Procopius gave a similar description of Vandal Africa. Landing at Caputvada or Shoal Head with the army of Belisarius in 535 A.D., he marched northward along the coast of Byzacium for 120 miles to Carthage. It was summer, but the orchards were full of fresh fruits. The soldiers, digging the trench about their camp on Shoal Head, struck a gushing stream of water a few feet below the surface in the midst of an arid steppe, evidence of high ground water; and the next morning they raided the fruit orchards of the nearby farms. Thence all the way north the country people sold abundant supplies to the army, which often pitched its tents amid trees laden with fruit, beside spring-fed rivulets.¹⁰⁷ Irrigation and high ground water explain the summer productivity of this coast land of Byzacium, where winter wheat thrived from early times with a mean annual rainfall of scant sixteen inches (Hadrametum or Sousse, 406 mm.).

Near Utica and Carthage.—Farther north about Utica and Carthage, where the Atlas ranges approached the sea, the summer crops had abundant flowing water. The busy port of Hippo Diarrhytus (Bizerta, rainfall 642 mm.) got its name from the canals irrigating its little plain. It is no wonder that Carthaginian fruits and vegetables, such as asparagus and artichokes, Numidian pears, and cherries, enjoyed a great reputation. But sixty miles west of Carthage, in the valley of the Bagradas River, was Vaga, the busiest market of northern Numidia, located in the rain shadow of the northern Atlas. Therefore when the Roman army camped there in the summer of 109 B.C., they found the country about it "a desert owing to the dearth of water, except the places along the river; these were planted in orchards and were resorted to by flocks and the cultivators,"¹⁰⁹ who clearly brought their stock to the irrigated meadows in the summer drought.

In the Interior.—Nor was intensive tillage by irrigation restricted to the Romanized population of the coastland. The native Massylii of inland Numidia diverted the River Abigas (Wadi Bu Duda) which flowed down from the high Aures Mts. (7585 feet, 2310 m.) past the town of Bagais (Baghai), into the Shottel Tarf, and distributed it by canals over the arid piedmont plain. They stopped the channels with earth to check the flow and opened them at will. Similar plains in this highland region, where streams and springs sufficed, were made to produce excellent grain and fruits.¹¹⁰ The districts of Tamugadi (Timgad), Lambaesis, and Lamasba, located at the northern base of the Aures Mts. at an altitude of about 3350 feet (1050 m., rainfall 12.5 to 15.5 inches) had extensive storage works for water, on which tillage depended.¹¹¹ The ruins of Lamasba, which lay near the modern site of Batna on the Trans-Atlas railroad, comprise an ancient inscription, dating from 220 A.D. It records the water rights of forty-three or more farms in the commune, and specifies the hours and exact dates when each estate might receive water. Plots were classified as *declives* or below the reservoir level, and *acclives*, or above, to which water had to be pumped. The "descendent" water was left flowing for fewer hours than "ascendent" water, because the latter was more slowly delivered. The amount of water was determined also by the size of the estate or the size of its harvests, it is not clear which. A small farm received "descendent" water for an hour in late September, and one four times as large received it for four and a half hours. Of

two farms, about equal in size or products, one received ascending water for sixteen and a half hours, and the other received descending water for ten and a half hours. These regulations, which aimed to secure impartial distribution in a region of inadequate rainfall and intense evaporation, were issued by the local senate and people.¹¹²

Irrigation in Syria and Palestine

In the lands bordering the eastern end of the Mediterranean, similar conditions of long summer droughts and uncertain rainfall obtained, with the consequent need of artificial watering. The early Aramaic-Semitic peoples of Syria and Palestine brought this secret of desert tillage from the stream oases of highland Arabia, and the invading Israelites adopted it along with other practices of sedentary life.

In Palestine.—In Palestine irrigation relied upon springs, underground water, cisterns, and a few perennial rivulets—"a fountain of gardens, a well of living waters, and streams from Lebanon."¹¹³ It was constantly associated with horticulture in the Bible, where the well-watered garden was the symbol of generous blessing. But irrigation was applied also to field and meadow,¹¹⁴ to vineyards, orchards, and groves. "I made me gardens and orchards, and I planted in them all kinds of fruit; I made me pools of water to water therewith the wood that bringeth forth trees."¹¹⁵

The narrow margin between food and famine, resulting from variable rainfall and porous limestone soil, made irrigation in Palestine a desirable resource. In those year-long periods of drought from which the country frequently suffered, every drop of water was conserved. Hence the surface of the country is pitted with ancient cisterns and reservoirs, whose restoration would renew the productivity of the land. The three great "Pools of Solomon" near Jerusalem are artificial tanks, measuring from 127 to 194 yards in length, from 49 to 76 yards in width, and from 25 to 48 feet in depth, fed by conduits from neighboring springs.¹¹⁶ The average rainfall in Jerusalem, at an altitude of 2600 feet, is 26 inches (649 mm.); but it drops to 20 inches (520 mm.) at Joppa on the coast and to 16 inches (420 mm.) at Gaza farther south. Both districts require irrigation for complete exploitation in good seasons, and for a partial crop in years of diminished rainfall. Abundant springs issue from the western base of the Judean Plateau, fed by the seepage waters of the long western

slope. They are in reality the surface mouths of underground streams, and are therefore copious enough to supply distributing canals. Others like them water the base of Mount Carmel and Gilboa.¹¹⁷ All these doubtless served to irrigate the scattered gardens of Palestine during the long summer drought. At the seaward edge of the Maritime Plain, wells sunk to the underground waters which everywhere underlay the fertile soil, kept alive the flourishing gardens and orchards of Ashdod, Askalon, and Gaza.

In the wilderness or desert of Judea, that arid eastern slope which sinks abruptly to the Dead Sea, no cultivation was possible, except where an occasional spring, like that of Engedi, bursting forth from the porous limestone escarpment, created an oasis as far as its waters reached. In the time of King Saul, as in that of Josephus (75 A.D.), the oasis of Engedi spread in a succession of vineyards and gardens,¹¹⁸ fed by brimming canals, 600 feet down to the Dead Sea. A nearly rainless climate, due to descending winds and intense heat, prevailed along the whole eastern base of the Judean Plateau, where this joined the sunken Jordan plain. Fertile soil on the natural terraces of an old lake basin offered attractive conditions for tillage, while fountains and spring-fed wadis afforded water for irrigation. Hence these old Jordan lake strands became from remote times the sites of flourishing agricultural towns, like Jericho, Pharselis, and Bethshan.

The situation of Jericho was typical. Located on a broad lake terrace 470 feet above the Dead Sea and about eight miles from the Jordan, it enjoyed excellent irrigation and drainage for the palm and balsam groves which made it famous in antiquity.¹¹⁹ These plantations, extending northward for a hundred stadia or twelve miles and merging into those of Phaselis at the mouth of the Wadi Ifjion, included also various other cultivated trees which produced excellent fruits.¹²⁰ A reputation for fertility, "the fattest of Judea," belonged to Jericho equally in the time of Joshua and of the Latin kings of Jerusalem.¹²¹ The modern traveller visiting the site today sees above the town the ancient tanks, one of them six acres in extent, whose conduits once made this district a miniature paradise.

Yet farther north, in the canyon mouth of the Vale of Jezreel, lay the fortress city of Bethshan, surrounded by gardens and orchards on the last broad terrace of the Jordan. Its irrigation streams were so abundant that during a Saracen attack in 634 A.D., they were poured out to convert the surrounding flats into

a marsh and thus held the enemy at bay.¹²² When it is remembered that this western terrace of the Jordan lay from 430 to 830 feet below sea level in the superheated rift, and from 2000 to 3400 feet below the summit of the plateau, whence the drying winds descended, and that this district was famous in antiquity for its grain, dates, flax, balsam, and other products, as for its sugar-cane under thrifty Saracen tillage, the conclusion is unavoidable that this was a banner district for irrigation, a conclusion that is corroborated by the scattered ruins of tanks and aqueducts.

In Phoenicia.—Phoenicia, owing to its more northern location and its bold mountain relief facing the rain-bearing winds from the west, had ample precipitation for winter tillage. But the steep slopes exposed the fields to over-rapid drainage and surface erosion, that would scour off the forest-made humus. Hence, physical conditions necessitated terracing at an early date, while the populous cities which exploited the patches of coastal plain made insistent demand for the additional food supply yielded by summer tillage. Consequently, both agriculture and irrigation were highly developed here in remote antiquity. Olive groves, orchards, vineyards and gardens, all requiring intensive cultivation, covered the littoral and dotted the slopes to an altitude of two thousand feet or more;¹²³ for at this elevation remains of ancient temples and other buildings have been found. Even today, the traveller coming from Damascus to the coast issues from the high tunnels of the Lebanon Mountains, as if he had thrust his head out of a window, and sees below him vineyards mantling the slopes up to a height of 2500 feet, and terraces of irrigated cultivation climbing far up the wadi walls. The Phoenicians were masters in the art of embanking and irrigating and were regarded as such by the Greeks,¹²⁴ whose engineer heroes, like Cadmus and Heracles, came from Syria.

In Coele-Syria.—Behind the wind-shield of the Lebanon Mountains, the need for irrigation increases with every added mile away from the coast and with every drop in altitude. The long line of cities and towns which from most ancient times traced the great north road through the Lebanon Trough from the sources of the Jordan to Antioch and Aleppo owed their agricultural wealth to the rich soil and abundant flowing water.¹²⁵ The great productivity of Coele-Syria under imperial Rome was due to effective equipment and administration of the water supply, which was furnished by the Orontes River, its western tributaries, and the full springs on the

Lebanon flank. Damascus, located about seventy miles from the Mediterranean on the edge of the Syrian Desert, behind the double screen of the Lebanon and Anti-Lebanon, in the rain-shadow of their towering ranges, has relied through the ages upon their snow-fed brooks to water her wide expanse of gardens, fields, and orchards. The rushing Barada issues from its canyon and flings abroad tassels of silver streams across the outstretched plain; the Pharphar brings its tribute from the copious springs of Mt. Hermon (9050 feet.) Only this delta of fertility, murmurous with the running water of countless canals, creates the Garden of Damascus between the Syrian Desert in front and the sterile plateau of Es-Sahara behind. In spring a cloud of pink and white blossoms broods over the oasis when the almond and plum trees are in bloom; in summer a vast stretch of green foliage shades off into the grey rolling steppe and the gleaming salt lake on the desert rim.

Irrigation of the Dry Lands of Greece

In Ancient Greece.—The ancient Greeks practiced irrigation from remote times, certainly before the tenth century B.C. The fine passage in the Iliad, which describes the peasant turning the stream into the ditch to water his fields and garden,¹²⁷ is echoed in the Odyssey, where a spring-fed canal waters the garden of Alcinous, and the waste from a roadside fountain waters a group thirsty plane-trees.¹²⁸ Sophocles, who belongs to the golden age of Athens, describes the flowery fields of the Cephisos valley kept green by irrigation.¹²⁹

“And there, beneath the gentle dew of heaven,
The fair narcissus with its clustered bells
Blows every day by day,
Of old the wreath of mightiest goddesses,
And crocus golden-eyed;
And still unslumbering flow
Cephisos’ wandering streams.”

Today the parcelled waters of the Cephisos are still distributed to the fields and gardens of the peasants by small canals which are called, in modern Greek, by almost the identical word used by Sophocles.

The chief centers of population in ancient Greece were located on the eastern side of the peninsula within the Aegean sphere of influence, and therefore lay in the rain-shadow of the western

mountains. Hence low and uncertain rainfall (16 to 20 inches) and long summer drought made irrigation imperative for their summer tillage. Cadmus and Danaus, immigrants from the East, were the mythical founders of artificial irrigation. Danaus, the hero-king of "thirsty Argos," whose imputed works probably represented the collective achievements of generations of the agricultural Danae tribe, introduced tillage and opened springs and wells, whereby he converted a barren waste into a fertile and well-watered plain.¹³⁰

Knowledge of in Plato's Time.—In Plato's model republic, the citizens constructed aqueducts across valleys in order to irrigate outlying gardens;¹³¹ they conserved the water supply and prevented floods by damming mountain torrents, that the water thus impounded "might produce streams and fountains for the fields below them and for all places, and thus cause the driest spots to possess water plentiful and good."¹³² So familiar were the ancients with the principle of impounding water that certain early writers mistook Lake Gygæa or Coloe, located four miles from Sardis in the Pactolus valley, for an artificial reservoir.¹³³

The long-established organization of irrigation is reflected in the system of water-rights which Plato formulated for his ideal Republic, doubtless in imitation of the Attic laws.¹³⁴ These were explicit and elaborate, as one would expect in a state which had no perennial streams and which had to depend upon springs or wells sunk to ground water, or upon artificial ponds or tanks. The office of water commissioner in Athens was once held by no less a man than Themistocles, who made a bronze figurine called the Water-carrier from the fines imposed on those who had taken water illegally.¹³⁵

Irrigation of Dry Lands in Italy

Italy, though located farther north and west than Greece, and therefore blessed with more abundant precipitation, yet suffered enough from summer drought to make irrigation necessary for the Roman farmer, as it is for the modern Italian peasant. Ancient Latin writers on agriculture recommended irrigation for various crops. Horace praised "the orchards watered by the flowing rills," but his fastidious palate condemned excessive irrigation and found "nothing poorer than a washed-out garden" with its insipid vegetables.¹³⁷ But "the endive rejoices in the rivulet that it sips," says Virgil.¹³⁸ Cicero enumerates aqueducts, the damming of

streams, the tapping of rivers, and the irrigation of the soil as among the great works of man.¹³⁹ Frontinus, water commissioner for the city of Rome in 97 A.D., reveals in his famous Report an old illicit trade in drawing off water from the public aqueducts for irrigation, between the city and the distant intakes in the mountains. But aqueduct water from impure or muddy sources, like the River Anio, was regularly reserved for the irrigation of gardens in and about Rome.¹⁴⁰

In the Alpine Piedmont.—Even in the Alpine piedmont of northern Italy where summer showers occur, irrigation was practiced in ancient times. In the second century B.C. the people of the lower Doria Baltea valley utilized that river to irrigate their fields; but the Alpine tribe of the Salassi, who lived up-stream and worked extensive gold mines, drew off practically all the water of the river to wash the gold. The situation occasioned numerous conflicts between the up-stream and down-stream peoples, until the Romans conquered the country in 143 B.C.¹⁴¹ Vergil, who doubtless in his boyhood often saw the waters of the Mincio River diverted to his father's farm near Mantua, beautifully describes the summer irrigation of tillage lands. The good farmer "guides over the crops the chasing runlets from the river; and when the blade is dying in the scorched and feverish field, look! on the brow of the slope he lures the water from her channels, and the rushing stream awakens a hoarse clatter among the smooth pebbles, and gushes cooling o'er the parched fields."¹⁴²

Reclamation of Dry Lands in Iberia

Of the Coastal Lands.—Irrigation in Spain is rarely mentioned by the ancient authorities, but it may be inferred from the evidences of advanced agriculture under the climatic conditions of the Iberian Peninsula. The productiveness of tillage in Lusitania (Portugal), indicated by the low price of food in the second century B.C.,¹⁴³ doubtless resulted from the alluvial soil and ample rainfall (25 to 40 inches) of the western littoral. The Mediterranean coastal strip, characterized by low rainfall (14 to 20 inches) and very dry summers,¹⁴⁴ was the most populous and productive section in Carthaginian and Roman times. Olives, figs, vines, and all kinds of fruit trees abounded where today flourish the famous *huertas* or irrigated gardens of Spain,¹⁴⁵ using water channels dating back to Roman times. Murcia was arid in ancient times as it is today. Its parched coastal plain near New Carthage was irri-

gated from the Tader River (Segura) to raise the spartum reed, which supplied the ancient port with cordage and later supported a big local industry.¹⁴⁶ Wheat fields and vineyards today in Murcia often need irrigation, just as they did in ancient times, according to Justinus.¹⁴⁷ In Spain it was not uncommon for the vintager to gather grapes in flooded vineyards, Pliny tells us.¹⁴⁸

This expert irrigation agriculture in Spain was confined to the coasts which had long been under the stimulating influences of Phoenician and Greek colonies; it presented a marked contrast to the backward tillage in the interior of the peninsula, where the absence of olive and vine only a few miles back from the sea, and the use of butter instead of oil, point to isolation from stimulating contacts.¹⁴⁹ Where such contacts had been old and active, progress was great.

Engineering Skill in Southern Spain.—Roman authorities agree as to the careful tillage, skillful mining, and advanced civilization of the native Tartessians or Turdetani of the Guadalquivir valley and the southern littoral. The language and burial customs of these ancient Spaniards point to immigration of far-ranging Mycenaean Greeks,¹⁵⁰ while the century-long presence of Phoenicians in their midst would amply explain their progress in mining and tillage. The master miners of the Lebanon Mountains, eager to trade in the copper, gold and silver of Spain, probably instructed the ancient Tartessian miners in principles of hydraulics, which were applicable also to irrigation. These Spanish natives conducted water to their placer gold deposits in trenches, which they often carried by tunnel through the mountains. When they needed increased hydraulic pressure to wash out the copper and silver ores, they built reservoirs high up the valleys. Springs encountered in the mines were drained by the screw of Archimedes, the method used in ancient Egypt for raising water from the Nile to adjacent fields.¹⁵¹ These same Turdetani cultivated the banks and islets of the Guadalquivir, and there maintained gardens and groves which delighted the eye.¹⁵² They produced the finest olives for which irrigation was necessary.¹⁵³ This high state of tillage and a rainfall between 10 and 20 inches are irreconcilable facts except upon the theory of irrigation. It is a suggestive parallel that irrigation in central California utilized mining ditches, and spread in the wake of the prospectors; for fruits and vegetables were needed in the mining camps remote from settlements. After the paying dirt was exhausted and the camps were abandoned, the

old ditches continued to serve for irrigation along the foothills of the Sierras.¹⁵⁴

IV. ANCIENT IRRIGATION LAWS

The wide distribution of irrigation in the Mediterranean region was reflected in an elaborate system of water rights which gradually developed out of custom and statute. The problem of such rights arose wherever a city like Athens or a village like Lamasbe undertook by communal effort to utilize and control the common water supply. The resulting laws showed local variations, but deviated little from certain big underlying principles. Finally in 550 A.D. they were codified in the legal Digests of Justinian, which embodied the water rights recognized throughout the Roman Empire; and in this form they reveal the importance of irrigation in ancient economic organization.

The law recognized that irrigation systems were very old. Hence specific water rights which went back beyond the memory of man were considered well founded without legal record, and could not be contested. Moreover, the phrase "ante-dating the memory of man" was broadly interpreted.¹⁵⁵

Regarding Deflection of Water Streams.—The importance of water rights in this Mediterranean region is attested by the legal safeguards thrown around them. The law forbade artificial works altering the normal flow of a public or perennial river, or its diversion into a different channel from that which it occupied the previous summer, lest the riparian rights of the abutting estates be invaded. Rectification even for the purpose of strengthening the river banks was open to question, if it impaired riparian rights, though the law recognized the public utility of security from river floods.¹⁵⁶ But if a river shifted its course and thereby receded from its former position, water rights pertaining to the lands along its old channel were lost or at least interrupted till the river by deposition of alluvium gradually returned to its old course. Meanwhile the opposite bank approached by the fickle stream profited by the new contact and secured unexpected favors; for the whole stretch of the river was subject to water rights.¹⁵⁷

Priority Rights.—More people could draw water from a public river than from an ordinary irrigation ditch; but all were compelled by law to respect the rights of their riparian neighbors or, if the stream were a narrow one, the rights of the estates on the opposite bank. The law provided in general that water taken

from a public river should be apportioned to the size of the respective riparian estates, except where one owner could prove a special right to a larger share.¹⁵⁸

Right of Access to Water Course.—Rights to the use of an irrigation channel, a reservoir or spring comprised the right of access to the same, in order to clean and repair it and to connect the private pipe or conduit; for only thus could an efficient irrigation system be maintained.¹⁵⁹ As such water courses necessarily crossed private estates, the land along them or about them, in the case of reservoir or intake basin, was reserved from building, road-making or consecration for religious purposes, or any use that might interfere with the regular service of the water.¹⁶⁰

Adjustment of Rival Claims.—Such an irrigation channel was called a *rivus*, and all persons participating in its water rights were *rivales* or rivals,¹⁶¹ a term which came to be applied to rivals in love by the old Roman comedies,—with peculiar appropriateness, for competition in water rights was keen, equity in them was jealously guarded, illicit draughts were common, and quarrels were frequent. The minuteness of the water laws and the analytical decisions of the praetors point to centuries of litigation in the effort to secure a fair distribution of the life-giving stream. Where several farms or farmers shared the use of a certain water supply, all had to be consulted before additional rights might be granted.¹⁶² *Rivales* and servient estates were treated impartially. No one could do anything to the water course which might infringe on the rights of his associates. If a man was unjustly prevented by a "rival" or by the owner of the servient estate from drawing water, so that his meadow land or orchard or tree plantation was injured by the resulting drought, he could sue for damages.¹⁶³ Where part of an estate was sold, the water in the irrigation channel serving that estate was apportioned to the amount of land sold and retained without regard to the fertility of the land conveyed away or its need of water.¹⁶⁴

The law *de rivis* applied when the water came from springs, even thermal springs.¹⁶⁵ Though cold water was preferable for irrigation, yet in certain localities where hot springs furnished the only water available, this law became operative, as in the Hierapolis basin of Greater Phrygia.¹⁶⁶ This was an old volcanic district in the upper Meander valley of Asia Minor,¹⁶⁷ where the rainfall was less than 20 inches (500 mm.) but where countless hot springs supplied the irrigation trenches and also the bath houses of Hierap-

olis, a famous Roman Spa perched on a high travertine terrace above the fertile plain. Today these waters still perform their beneficent task on peasant farm and orchard; but the ancient resort lies dead, wrapped in a winding sheet of travertine.¹⁶⁸

Relating to Time Allotments.—Water rights varied greatly in time allotment for tapping aqueduct or reservoir. They might entitle a man to draw water all year round, or only in summer, or in certain months or certain days or certain hours. They were apparently regulated by the abundance of the supply, the seasonal need of irrigation, the size of the estate, and the purchasing power of the owner, though the latter point is only a matter of inference since no data are available. The law made a fundamental distinction between annual or daily water rights and summer water rights (*aqua cottidiana et aestiva*), a distinction based legally upon use but actually upon the reliability of the water supply. Only unfailing springs and streams which persisted through the summer drought could be subject to these two classes of rights. Daily water conferred annual use, available for both summer and winter, though its value in the cold rainy season was negligible except for watering cattle. Summer water, also derived from perennial sources, was drawn off only in summer and chiefly for irrigation. Such summer rights were determined by the purpose of the farmer and the nature of the district, which for climatic reasons required water only in the season between the vernal and autumnal equinox.¹⁶⁹ But the delivery of the water on March 25th enabled the farmer to turn it on his meadows and legume crops as soon as it was needed. However, restrictions of water in winter to estates entitled to *aqua cottidiana* certainly contributed to economy both as to use and leakage from the private conduits.

Summer rights were further restricted by allotment periods; and these differed greatly. From actual or suppositional cases cited by the praetors to elucidate the law, it appears that a grant might authorize a man to draw off water only in the daytime or only by night; or every day, or every other day (*tertio die*) or every fourth day (*quinto die*); or for one hour daily or on alternate hours daily, or for two or three hours on specified dates; or in alternate months or for one specified month during the summer. Moreover the water right was confined to the use of a certain aqueduct or reservoir or spring, and it was void for any other source. Withdrawal of water from any other source or at any other time than that specified involved forfeiture of the right. Forfeiture was also the

penalty for non-use during a period fixed by statute.¹⁷⁰ Nothing was left to the discretion of the user; everything was fixed by the terms of the contract.

The object of this rigid control was clearly to maintain a steady flow of the water for all entitled to its use, and hence to guard against a heavy over-draft that might decrease or stop the flow. For instance, the choice time for irrigation was night, when the plants were cool and loss of water by evaporation was low. But if all the sluices into the private conduits were flung wide open at ten P.M., the aqueduct might be empty for those drawing water at four A.M. To avoid such an injustice, where several persons had servitude rights in a channel from a spring on an adjoining estate, each man on his particular day opened his private conduit or pipe from the common canal, the parties following each other in order of distance from the source. If one man drew no water during the prescribed period, he forfeited his water right by non-use. Nor could he let one of his associates draw water in his place, for each man was limited to a separate right for his separate farm. However, if all the men were joint owners in a syndicate estate, the law was differently applied.¹⁷¹ In that case, it assumed a wise distribution of the water for the benefit of the group, without question of conflicting rights.

Safeguards for individual rights were judiciously applied. If the water supply in a channel were abundant, several persons might receive water grants on said channel for the same days or the same hours, though the usual grant specified different days or different hours.¹⁷² If two persons who had been accustomed to draw water separately from the same irrigation channel at certain hours, agreed to exchange their hours of use for their mutual convenience, they did not forfeit their water rights, despite the fact that neither had adhered to the hours specified in his grant.¹⁷³

Coöperative Effort.—Irrigation works could be installed, as a rule, only by concerted effort. A peasant might use a spring or well on his farm for this purpose; but more often it was a city or rural district which resorted to this corporate enterprise for the common good. All citizens, by labor or taxes, contributed to the construction and maintenance of the irrigation works, all were entitled to a share of the benefit, and all learned a lesson in the sovereignty of law.

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DOMESTIC AND MUNICIPAL WATERWORKS IN ANCIENT MEDITERRANEAN LANDS

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THE long summer drought made the presence of water a controlling factor in the distribution of population in the ancient Mediterranean lands. It determined both the size and location of the rural community, wherever irrigation made a drain on the local water. The scarcity of unfailing streams emphasized the importance of perennial springs or wells. Where these were numerous the villages were generally numerous and small; population broke up into small groups, with their farm lands conveniently near. But where the springs were sparsely scattered, population had to concentrate about them in fewer groups, no matter how long might be the way from home village to outlying fields.

IMPORTANCE IN THE REGION AT LARGE

The growth of large and populous cities became possible only after the development of a complete technique of waterworks, which utilized water from local sources and also introduced it from distant springs, rivers, or lakes. The construction of such works depended also upon the concentration of urban wealth. Impressive waterworks appeared first in ancient seaports with profitable maritime commerce like Samos, Cnossus, Athens, and Megara; or ancient capitals like Jerusalem, Corinth, Carthage, and Rome; or active local markets like valley towns of the Apennines or the Atlas Mountains. This waterworks construction was stimulated by the requirements of municipal and private baths, made almost imperative for health and comfort in the hot, dry summers. Moreover, the ancients recognized the connection between water famine and pestilence. Virgil vividly describes their operation in Crete.

All ancient literatures reflect the concern of the Mediterranean people to secure a pure and ample domestic water supply. Aristotle says: "There should be a natural abundance of springs and fountains in the town; or, lacking these, large reservoirs may be established for the collection of rain water, such as will not fail when the inhabitants are cut off from the country by war . . . if the water supply is not all equally good, the drinking water ought to be separated from that used for other purposes."

To protect the water against pollution and theft heavy punishments and fines were imposed in Greece and Italy. Furthermore, the Roman plutocrats had their drinking water first boiled and then chilled by mountain snows; if the snow was not clean, it was strained through fine linen cloths. In this they imitated the practice of Cyrus the Persian who on his campaigns took his drinking water with him from Susa, boiled and carried in silver vessels.

As to the sources of drinking water, all authorities commend spring water and rain water conducted to a reservoir in earthenware pipes, as opposed to water from muddy streams or stagnant pools and marshes. Columella gave a second place to mountain streams tumbling over rocks. He agrees with Hippocrates the great physician, who preferred water "flowing from high ground and hills, sweet and clear" and water derived from deep wells.

From Palestine to Spain the "fountain of living water" was the great desideratum. The spring was the nucleus of town and village life, the starting point around which the community grew up, like the Virgin's Spring in Nazareth. In Greece also, to the mind of the native, it became identified with his home town. When Theognis of Megara (d. about 540 B. C.), disgusted because a political upheaval dislodged the oligarchs and placed the common people in power, decided to become a voluntary exile, he expressed his purpose in terms of his native spring:

The years I dropped my pitcher in the clear dark village spring
How sweet and good the water's taste did seem.
But now the rains have flooded it, the mountain streams have
muddied it,
I'll drink another spring, a larger stream.

About the village spring or its reservoir the women gathered in the twilight, water jars on their shoulders, as they may be seen today in Nazareth or some hamlet in the Apennines, to linger and gossip. Here at all hours the men resorted to discuss local affairs and advertise matter of local concern. The importance of the town spring or pool is reflected in the care Pausanias takes to mention its name, its site, its mountain or piedmont source; and, if its water has been brought from a distance, he tells who installed the conduit. He does this for all the ancient Hellenic world from Antioch and Asia Minor to Syracuse with its Fountain of Arethusa. He includes even a village like Pyrrhichus near Cape Malea, whose sole water supply was provided by a conduit built by the demigod Silenus from a distant spring to the market place. Many of the springs have a mythological or miraculous origin, like the Dirce Spring of Thebes; or the conduit from mountain to city is attributed to the legendary founder of the colony, like the aqueduct to the Theban Cadmeia from the Cithaeron Mountains. In any event it is identified with the

beginning of the city. The Fountain of Priene, the famous spring of Corinth, shows five building periods in its well house, which dates from the sixth century B. C.

WEST OF THE JORDAN

Conditions in Palestine and Syria favored an individual rather than a community water supply. "Drink waters out of thine own cistern, and running waters out of thine own well," says the Hebrew proverb. Better still was a spring, or "fountain of living water," for cisterns hewn from the limestone rock might leak through natural clefts. Often the spring in the limestone country was underground, reached by a well shaft; where the flow was very abundant, such a spring or well was sure to have a whole village or town grow up about it. Such is the Virgin's Spring of Nazareth, sole water supply of the town today as in the boyhood of Christ. The numerous place names in Palestine beginning with *En* or *Ain*, meaning spring, point to the water supply as the determining factor in locating a town or village.

The coastal plain of Palestine and Syria was supplied by the "fountainheads," or springs, that burst forth near the base of the Judean and Lebanon highlands; and also by wells sunk to the ground water. In the Philistine plain the ground water rose near the surface and supplied the ample wells of Gaza and Ashdod; but on the steep coast of Lebanon where the ground water has a rapid run-off, the ancient Phoenicians probably placed their chief reliance upon mountain streams and springs. The authorities give meager material on this point, though the Phoenicians were famous throughout the Mediterranean region as hydraulic engineers. Only Strabo reports the ingenuity of the island city of Aradus in achieving a water supply. Rain water from the roofs was stored in cisterns; and in addition a submarine spring, which welled up in the sea a few hundred yards from the port, was tapped by sinking over it a great inverted funnel with a hose attached.

Springs are copious and numerous along the western escarpment of the Judean Plateau but shrink rapidly in size and number in the rain shadow to the east. The pastoral region of the Negeb to the south has always been a transition belt physically and climatically between the Judean Plateau with its moderate winter rains and the Desert of Paran. The few springs and wells of the Negeb were essential for field or herd. Even Debir, near the northern margin of Hebron, was scarcely habitable without springs. Isaac, who occupied the southern district, kept close to the well of Lahai-roi. Wells sunk in the dry wadi beds were private possessions fought over by the rival herdsmen of Abraham and the neighboring king of Gerar. The

Philistine sheik filled up the wells, using an ancient method of maintaining a waste boundary to exclude encroachments of neighboring nomads. It was employed also as a punitive measure by the kings of Judah and Israel when they invaded the Moabite country east of the Dead Sea.

The cities of Palestine, with their concentrated populations, felt the need of exploiting all local resources to assure their water supply. As walled towns, subjected to siege in a warlike age, they were peculiarly dependent upon the water supply of summer, because campaigns were generally made in this season. While each house had a cistern to store the rain water from its own roof, the city provided public pools or reservoirs formed by damming a valley stream; in many cases these were supplemented by aqueducts from distant springs. Pools acted as settling tanks and were often connected with public baths. In this case they were surrounded by porticos where the bathers rested or lounged, protected from the sun. The Pool of Siloam at Jerusalem had four such porticos, whose remains have been excavated, and the Pool of Bethesda had five, one of them running across the middle of the basin and dividing it into two parts. Besides Siloam and Bethesda, Jerusalem had its Upper Pool, its Lower Pool, the King's Pool, Old Pool, and Hezekiah's Pool. Josephus mentions also four others existing in the city at the time of the Roman conquest. The Pools of Solomon, three large reservoirs ranging from one to two acres in area, may be seen today beyond Bethlehem eight miles from the ancient capital. They are possibly the "pools of water" made by Solomon to irrigate the gardens and orchards of his summer palace; but their water was conveyed to Jerusalem by a very ancient conduit, over thirteen miles long, which tunnels the hill of Bethlehem. The Pool of Siloam was fed in part by a tunnel conduit which brought water from the Fountain of the Virgin and which, from an inscription on it in Phoenician characters, must date from the eighth century before the Christian era or even earlier. King Hezekiah dammed the upper watercourse of Gihon and brought the water by conduit to his Pool in the west side of the city of David. The channels were largely hewn in the rock and were always covered with stone slabs to keep the water pure and reduce evaporation.

Other towns also had their pools, like Gibeon, located ten miles northwest of Jerusalem and famous for its "high place" where Solomon worshipped; Hebron, near the summit of the Judean Plateau where two ancient reservoirs survive, one 132 feet square. On the arid eastern escarpment of the Judean Plateau, tanks and aqueducts fed by limestone springs supplied water to cities like Jericho and Bethshan. Herod built reservoirs on a large scale to impound the local spring water in the citadel of Macherus, a natural fortress on a high headland overlooking the Dead Sea; and he also built rock-hewn cisterns in

Masada, as Josephus has described, when he began to fortify the frontiers of his kingdom.

ON THE DESERT'S EDGE

Across Jordan, on the westward-facing escarpment of the plateau of Arabia, poverty of water necessitated its early conservation wherever towns grew up along the ancient highway from the Red Sea north to Damascus and the great bend of the Euphrates. The Moabite capital of Heshbon, an important place when Moses traveled towards Canaan, had a pool fed by springs or streams from Mt. Pisgah and famous for its beauty. The ruins of a tank at Heshbon show it to have been 191 feet long, 139 feet broad, and 10 feet deep. Mesha, King of the Moabites in the time of Jehoshaphat, according to the famous Moabite Stone built reservoirs for Baalmeon and other cities of this plateau. Madeba, which existed in Mesha's time, now shows the ruins of a pool which measures nearly three acres.

Owing to the incursions of desert tribes on the western edge of the Syrian Desert, extensive water works had to wait for the rule of the Romans and were therefore chiefly of Roman construction; but in some instances the Roman and earlier native works lay side by side. Petra is an example. Known to the ancient Hebrews as Sela, or the Rock, it was the capital of Edom when that country was conquered by King Amaziah of Judea; but it began to attain importance as a desert market under the Nabateans about 100 B. C. and reached preëminence only after the Roman conquest. Located on an arid plateau 3000 feet high, south of the Dead Sea, it depended on ancient aqueducts from springs two miles up the Wadi Musa Valley above the town. The earliest conduits were cut in the soft sandstone of the wadi walls, far above the stream; but the later Roman aqueducts of clay pipe were let into the opposite face of the cliff and secured by cement. The "high places" also about the city were provided with small rock-hewn pools which doubtless figured in the primitive ceremonies to rain-giving Baal. An extensive system of channels and small tanks for gathering the rain water equipped the long canyon approach to one of these "high places" for the benefit of thirsty pilgrims in the dry season. These undoubtedly belonged to the earliest period of the city's life. Strabo tells us that in his time Petra derived from its springs enough water for domestic use and for the city gardens but that the country about was for the most part desert. These conditions point to careful exploitation of the local water supply.

Despite these provisions for a regular water supply, there were times when successive years of diminished rainfall encroached upon the narrow margin of moisture; when men scoured the country for

the last surviving trickle from some hidden spring; and when the hart indeed panted after the water brooks, which had become beds of gravel. Then Isaiah's promise to the righteous man, "Bread shall be given him; his waters shall be sure," guaranteed something more than the commonplace. The Hebrew proverb "Stolen waters are sweet" testifies to the fierce thirst that prompted the petty theft rather than to a fictitious zest lent by an unlawful act. The scriptures abound in instances of water miraculously supplied, generally in the "wilderness" or desert borders but occasionally also on the Judean Plateau and even on the wooded slopes of Mt. Carmel.

All the region on the fringe of the Syrian Desert, from Palmyra to Petra, offered sites for settlement only where oasis conditions existed; where rare perennial streams like the Jabbok, Yarmuk, and "the rivers of Damascus" offered an unfailing though variable water supply; or where water from distant wadi or springs could be brought by aqueduct or underground conduit to reservoirs in the town. The copious streams that flowed from the Anti-Lebanon range and Hermon to the oasis of Damascus guaranteed that city a natural water supply. Elsewhere the human task was vastly greater, and the accomplished work more easily jeopardized. Palmyra is described by Pliny as located "in a region that all around in a vast circle is a sand desert and separated by nature from other lands" yet famous for its fertile soil and pleasant water brought in covered aqueducts and stored in reservoirs. Palmyra, first mentioned in 41 B. C. and flourishing in the imperial period of Rome, owed the security of its water works to the partial protection of the Romans, whose trade the city forwarded to the Euphrates.

The remains of all the highland cities of eastern Syria show the ruins of Roman aqueducts, baths, reservoirs, and occasionally a *naumachia*, or naval pool, like that at Gerasa. Gadara, which lay on the route from Esdraelon to Canatha and the Hauran, occupied an admirable fortress site on an important highway but had to depend on cisterns and a meager spring till the Romans built it a thirty-mile aqueduct. Their engineers also exploited the streams of the Hauran Mountains, whose great massif, 6032 feet high, condensed abundant winter rains and supplied water to Canatha, Bostra, Philippopolis, and the three hundred villages skirting the slopes.

Other towns of Gilead and Bashan whose history extends back to legendary days relied on cisterns, rock-hewn reservoirs, and wells, whose remains can be seen today amid the later remains of Roman baths and aqueducts. The ancient capital, Rabbath Ammon, rebuilt by Ptolemy Philadelphus and later improved by the Romans, depended during the siege of the city by Antiochus (218 B. C.) upon an underground passage giving access to one of the many deep reservoirs that were utilized by the natives in periods of danger.

HELLENIC CONCERN OVER WATER SUPPLY

The Hellenic cities show equal concern for their water supply and a high regard for springs, to which they often attributed great sanctity or a miraculous origin, probably as a method of social control to protect the water supply against pollution. Many of them sacred to Apollo and Demeter, divinities of agriculture, suggest the utilization of their waters for irrigation. Others issued from sacred groves, which probably owed their sanctity as well as their trees to the god-given waters. Others rising in caves made the grottos holy places, shrines of gods or abodes of nymphs. In the summer droughts the undiscouraged flow of some rocky fountain must have seemed to the thirsty a perennial miracle. One hears the wayfarer exclaim with Pindar, "Water is best of all." In modern Greece the good-by wish to the departing guest is: "A safe journey and fresh water."

Springs, of paramount importance to the ancient Greek cities, provided the first local water supply. City springs meet us in Homer, in the fountain of Hyperia in Pegasae on the Gulf of Volo, by the roadside in the city of Alcinous, and in the Fountain of Arethusa in the capital of Ithaca. The last became famous; its name reappeared in the city spring of Euboean Chalcis and also in Syracuse. The Greek tyrants justified their beneficent despotisms by improving the water supply of their respective capitals. Pisistratus (605? to 527 B. C.) adorned the chief spring of Athens with a hall of columns where the water issued from nine jets, giving it the name of Enneacrunus, or fount of nine mouths. Water was brought for it by two conduits from the upper course of the River Ilissus, one of them passing underground out to the Piraeus. Other aqueducts, one from Mt. Hymettus and two from Lycabettus, contributed to the water supply of Athens, while a system of canals from the Cephissus irrigated the neighboring olive groves and gardens. The Greek conduits were generally subterranean channels cut in the natural rock. To keep them safe and clean, shafts were sunk at intervals, admitting light and air. At the entrance to Athens the aqueducts discharged their water into rock basins for settling before distribution through the city. When necessary, conduits pierced the hills by means of tunnels, as in Palestine.

Megara had its waterworks in the form of a long canal, built by the tyrant Theagenes in 620 B. C., which brought water from the mountains to a beautiful basin in the market place, famous for its size and decorations. Polycrates of Samos, about 530 B. C., employed the leading hydraulic engineer of his time, a native of Megara, to supply Samos city with water. The need was crucial for a big town on a small island, which, however, had a high mountain core. The task was accomplished by piercing the mountain by a tunnel nearly

a mile long to reach the springs of Mt. Ampelus. Thence water was distributed to the wells, pipes, and baths of the city, while the surplus went to cleanse the sewers. Corinth had the most famous city fountain of all Greece. The upper spring, located in its high rock citadel, was said to be the gift of the river god Asopus. So precious a boon on that bare rock could be explained only by a divine origin. The lower Priene spring has an elaborate well house. The colonnade over the basin and the bronze lion heads from which the water flowed are still to be seen.

More elaborate even than anything that democratic Greece could show were the waterworks and drainage system in the royal palaces of Crete, a thousand years before the time of the Greek tyrants. The palace of Cnossus had lavatories and sinks equipped with terracotta pipes and drains of stone or cement. That of Phaestos had bathrooms well constructed and amply equipped. The water was probably brought in artificial channels from the high mountain range that forms the backbone of the island. These works antedated the Hellenic invasion of Greece and may have furnished the models for the later water systems. The widespread development of hydraulic engineering, however, must have been due to the need of irrigation as well as that of a reliable domestic water supply. The finest Greek aqueducts were the underground conduits of Syracuse, which brought drinking water to the city. These were destroyed by the besieging Athenian forces in 413 B. C. But Syracuse was not the only city so supplied. The victor of the Olympic Games in 452 B. C., returning to his native Camarina in Sicily, praises "the River Oanis and the lake of his native land, and the sacred channels wherethrough doth Hipparis give waters to the people."

ROMAN DEVELOPMENTS

The Greek colonies located about the Bay of Naples may have given the first impulse to the utilization of the hot springs there for public baths and the consequent installation of the waterworks that supplied these baths and the fountains and fishponds in the private gardens of Herculaneum, Pompeii, and Cumae. But the city of Rome, heir to the hydraulic science of the Mediterranean Basin and desirous of providing water for its large population, shows the most extensive waterworks. The report of Sextus Julius Frontinus, water commissioner of Rome in 97 A. D., gives a complete survey of its system. The nine Roman aqueducts were carried mostly underground for safety in time of war. They crossed valleys on high arches. The Appian aqueduct, brought to the city in 313 B. C., was more than ten miles long and had its intake at a spring on the estate of Lucullus. The Marcian was sixty miles long and had its source in the Sabine

Mountains "where countless springs gush forth from caves in the rocks." Such springs were sought out, opened up to get an ampler flow of water, and then walled in with concrete to keep the source intact. The old Anio aqueduct, built in 273 B. C., came from the Anio River above Tibur, forty miles distant. Its water was often muddy during the winter rains, as was that of the New Anio conduit till a settling tank was built.

Rigid distinction was made between pure and impure water by the Roman water commissioner. The supply from the Alsietina duct was drawn from a lake, none too clean; hence it was not distributed to the public but was reserved for the Naumachia, the naval lake of the Caesars, or for irrigating gardens. The spring-fed aqueducts were considered the best, and these were reserved for drinking water. The water system of Rome supplied private houses, the 39 ornamental fountains of the city, and 75 public structures, chiefly baths, like those of Nero and of Caracalla. Gardens in and about the city also were supplied with water.

Fraudulent tapping of the public aqueducts and reservoirs was rife from early times. Illicit pipes were laid by the thieves, and the robbery was connived at by the watermen. Landed proprietors having estates along the course of the aqueducts tapped them to water their gardens. Frontinus, when appointed commissioner, made a survey of the city's water supply and rounded up the delinquents.

The attribution of curative power to various pools and fountains and even rivers permeates ancient Mediterranean life. The healing power of hot springs was recognized and exaggerated in Italy, especially in the volcanic regions, where the baths of Baiae and Naples became famous.

Commensurate with the importance of springs under Mediterranean climatic conditions and their large number wherever limestone predominated, an elaborate fountain architecture developed which set the standard for later times. This was especially varied and beautiful in the gardens and peristyles. It was stimulated also by the custom of erecting a nymphaeum, or temple, above the spring where it issued from the mountain source.

Finally, Rome instituted the Fontinalia, a religious festival in which garlands were thrown into all the city fountains of Italy and the god Fons appeared with the goddess Flora to secure abundant water.